



NIGERIA

ANNUAL REPORT
ON THE
Agricultural Department
FOR THE YEAR
1938



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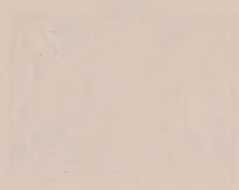
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UNITED STATES

DEPARTMENT OF AGRICULTURE

OFFICE OF THE SECRETARY

Agricultural Experiment Station

WASHINGTON, D. C.

1918

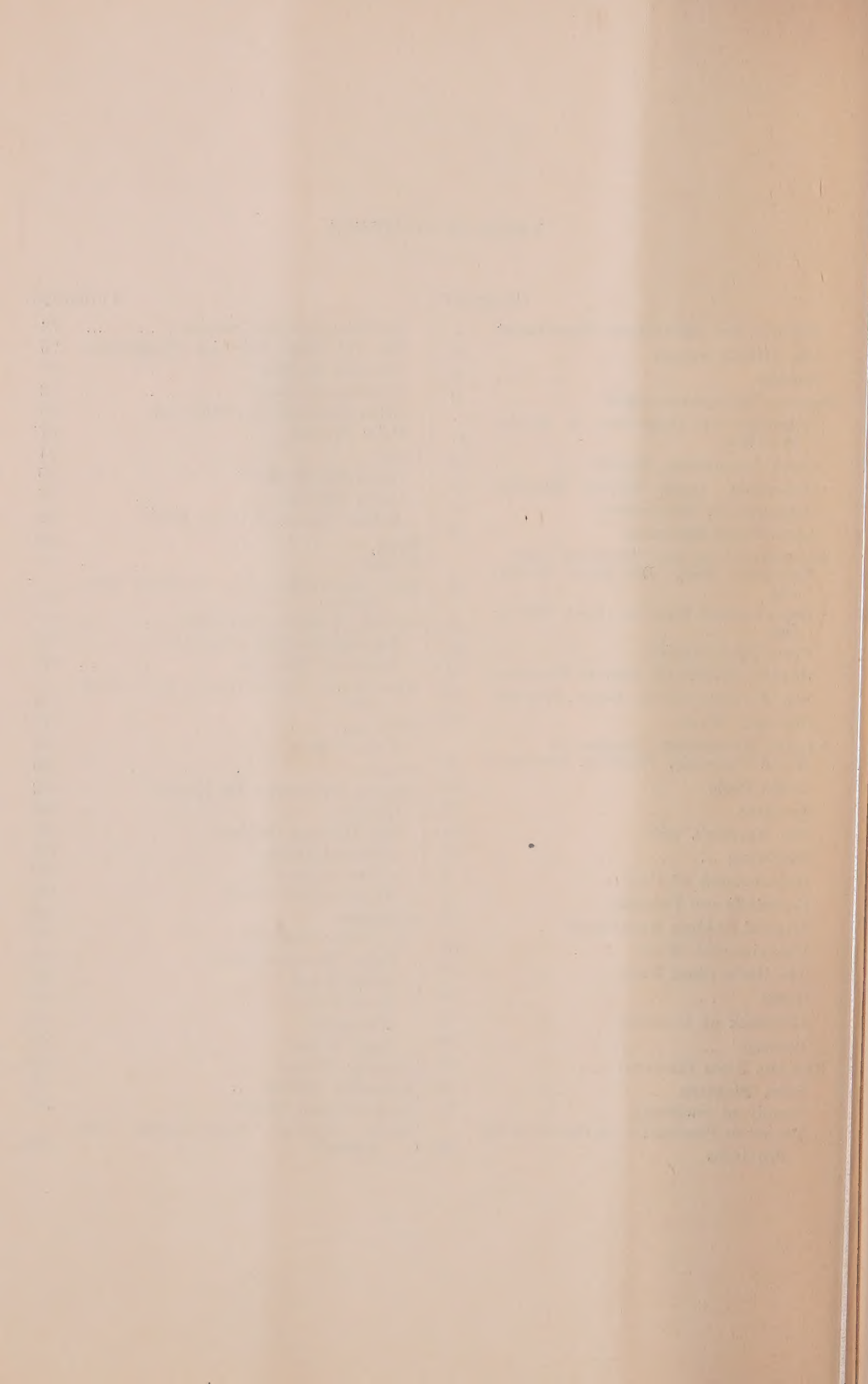
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POLICY OF THE AGRICULTURAL DEPARTMENT.

The policy of the Nigerian Agricultural Department was outlined by His Excellency in his address to the Nigerian Legislative Council on 6th March, 1939, in the following words:—

“ Throughout the year the Agricultural Department has continued to follow its clearly defined policy, the objects of which are briefly as follows:—

- (a) The maintenance of soil fertility and the development of systems of farming which will achieve this object.
- (b) The production and improvement of local foodstuffs and local livestock.
- (c) The production of export crops, the improvement of existing export crops and the investigation of possible new crops.
- (d) The efficient marketing of agricultural produce.”

2. Although the main lines of this policy were formulated by my predecessor and have been followed for many years they had not previously been so clearly defined and communicated to the public. As far as possible, with the funds available, we are attempting to carry out the whole of the policy laid down by His Excellency, but ever since the Department was reorganised in 1921 the evolution of systems of farming which will maintain soil fertility has always been regarded by us as our most important piece of work, and has therefore taken precedence over all other problems in our investigational programmes. We believe that farming systems which will permanently maintain soil fertility are also the systems which will provide both the greatest quantity of food for the people and the greatest quantity of produce for export. In our opinion such systems are essentially the most important safeguard against accelerated soil erosion.

3. The production of export crops, important as this is to the wealth of the country and to the revenue of the Government, must be subordinated to the production of foodstuffs for local consumption, for people who are underfed cannot do the maximum amount of work. But the health of the people depends on quality of food as well as on quantity and quality is largely dependent upon soil fertility. Maintenance of health therefore is as much an agricultural problem as a medical one and much of the experimental work carried out on all our farms is concerned with the study of food crops for both human beings and livestock. Experience has already shown us that as regards livestock improvement is also primarily dependent on nutrition.

4. While we have always recognised that it is one of the duties of an Agricultural Department to do all it can to help the producer to market his produce as efficiently as possible, we have hitherto, by means of our system of Produce Inspection, concentrated our efforts on ensuring that produce exported from Nigeria

should meet the requirements of the world's markets as regards quality. Two years ago, however, we took a further step and in connection with the cotton crop inaugurated a system of licensing both buyers and markets. The possibility of extending this system to the marketing of other products such as palm oil, palm kernels and cocoa is now being investigated.

5. The imperative need for obtaining the greatest possible "value for money" from the funds at our disposal led, during the year, to an overhaul of the policy of each of our farms and farm centres and the problems to be studied at each one have been very carefully defined. Thus the farm centre at Zonkwa is concentrating on the study of pagan agriculture and the improvement of food supplies for pagan people, that at Birnin Kebbi on the management of goats, that at Ilorin on breeding stock for the middle belt and so on. It is hoped that in this way overlapping and loss of effort will be effectively avoided.

THE 1938-39 SEASON.

6. In Northern Nigeria generally the onset of the rains was somewhat late and rainfall was light until the end of June. This caused difficulty with the establishment of early crops, and resulted in low millet yields and the late planting of cotton. Exceptionally heavy rains were experienced in Kano and Daura in August which caused waterlogging and adversely affected the yield of groundnuts. The yields of guinea corn and root crops were, however, generally excellent and food is both plentiful and cheap except in parts of Zaria where there is a shortage of corn. This, however, was due to locust damage and the over-selling of corn to the Plateau, rather than to the effects of the weather.

7. In the Southern Provinces rainfall was about average at Benin and Umuahia but at Ibadan the lowest rainfall for twenty-four years was recorded, and throughout July there was an almost complete absence of rain. On the whole, however, the rain was well distributed and except in the North of the Oyo Province the yield of food crops was good. At Umuahia, although the total rainfall was average, the distribution was unusual; March and April were exceptionally dry as were July and August. The season there was favourable for food crops, but at both Benin and Umuahia the yield of oil palms was lower than usual. Throughout the Southern Provinces the rains were above average in September and October, and this caused a high incidence of black pod disease in cocoa. At Umuahia nearly fifty per cent of the season's rainfall occurred in the three months September, October and November.

LOCUSTS.

8. The present outbreak of the African Migratory locust which began in the Middle Niger region (French Sudan) in about 1926 shows no signs of abating and appears even to be increasing again. In Nigeria more adult swarms were reported in July, 1938, than in any July since 1932: at this time of the year most of the swarms consist of young adults derived from hopper bands in Nigeria and the French territory to the west. The number of swarms reported each year from 1930 to 1938 have been as follows:—

Year.	Number of swarms.	Year.	Number of swarms.
1930	2,914	1935	2,052
1931	3,570	1936	1,568
1932	4,521	1937	2,014
1933	3,110	1938	2,359
1934	2,964		

Strangely enough the hopper infestation in the Autumn of 1938 was the smallest experienced since the commencement of the present outbreak. The probable reason is that owing to the comparative absence of Harmattan in the early Autumn, the south-westerly migration was delayed and the bulk of the breeding occurred in French territory. During March, 1939, breeding occurred in the marshes bordering the section of the Niger River lying to the North of the Lafia and Pategi Emirates and it is proposed to make a locust survey of this area in February, 1940. Adult swarms were numerous in April, 1939, but the amount of damage to crops so far reported has not been serious. The annual patrol of the south-western shore of Lake Chad was carried out in February, 1939. Only three specimens of *Nomadacris* were seen. Forty-eight *Locusta* (*solitaria* and *transiens*) were collected whereas, during the 1938 patrol, not a single specimen of this species was seen. There was a marked increase in the grasshopper population as compared with the previous year.

PRODUCE INSPECTION.

PRODUCE INSPECTION STAFF.

9. The last vacancy in the European staff was filled by the end of May and the reorganisation of the Eastern Areas was completed in July, 1938. The closer supervision by the increased European staff, and the increased number of acting Sub-Inspectors of Produce, has resulted in greater efficiency. Steady improvement is seen in the work of the Examiners and it is pleasing to be able to record that the number who failed either to earn increments or to pass their efficiency bars was fewer than in recent years, and the number of appointments terminated was the lowest since the inception of the present system of Produce Inspection.

10. A complaint was received from all Agents in Opobo that the inspection of palm kernels at Opobo was too severe but the matter was soon settled and the Department is now taking regular samples for laboratory examination to determine the average moisture content of commercially dry kernels.

EXTENSION OF INSPECTION TO KABBA PROVINCE.

11. At the request of the merchants concerned, an Inspector of Produce visited the Kabba and Niger Provinces to investigate the necessity for Produce Inspection there; eventually Government approved of the extension of the scheme to certain stations in the Kabba Province only, where inspection commenced on the 1st April, 1939.

COCOA COMMISSION REPORT.

12. In as much as the Report of the Cocoa Commission recommended that there should be no buying agreement amongst the firms, the Report was received with pleasure by the African middlemen and producers. With no buying agreement in force the middlemen expected a rise in price and were suspicious that a private agreement was still in force when price fell instead of rising. The middlemen were not in favour of the recommendation that Government should wholeheartedly adopt the co-operative system as the desirable method of marketing Nigerian cocoa as they considered that they would be put out of business. On the whole the Report of the Commission received very little attention from producers.

CAMEROONS UNDER BRITISH MANDATE.

13. For the first time it was found possible to post an Inspector of Produce to the Cameroons under British Mandate for a period of six months.

The following table shows the tonnage of produce passed in the Cameroons during the financial years 1937-38 and 1938-39:—

Year.	Palm kernels.	Palm oil.	Cocoa.
1937-38 	2,092	2,786	5,083
1938-39 	2,210	3,157	3,252

The cocoa crop was disappointing and a considerable amount of black pod cocoa was produced. An amendment to the Regulation was made to permit the shipment of plantation "black" cocoa. Previously the plantations had to apply for a Special Licence to cover shipments of "black" cocoa but, as "black" cocoa is produced even in the most favourable years, it was considered advisable to make a separate grade for such cocoa.

INSPECTION OF GROUNDNUTS.

14. For several months in the "off-season" an Inspector of Produce visited the Groundnut producing areas to explain to farmers the reasons for Groundnut Inspection, and paid special attention to those areas which had given the worst results during the previous season.

15. Several Examiners were sent to the Southern Provinces for intensive training and three more Senior Examiners were posted to the Area for the season. The closer supervision and better trained staff resulted in further improvements in the quality, as can be seen from the following figures:—

Year	No. of Samples	% Stones	% Shells	% Total Adulteration
1937-38	72	1.190	0.502	0.692
1938-39	109	0.132	0.307	0.439

16. The season opened on 1st November, 1938, this being a later date than normal. The later opening date put a stop to the trouble usually experienced with wet groundnuts at the commencement of each season.

17. Adulteration is now almost entirely a matter of careless preparation, as producers, and middlemen who purchase undecorticated nuts, continue to prepare the produce by beating on the ground. This naturally results in stones getting mixed with the nuts and if producers and middlemen could be persuaded to crack the nuts in wooden mortars there would be a further improvement in quality.

18. At a recent meeting of the Advisory Committee the members considered that the operation of the Regulations had achieved the primary object of stamping out adulteration. On the Home Market Nigerian f.a.q. groundnuts obtained a premium of from 1s. 3d. to 5s. 3d. per ton over Coromandels, machine-dried, decorticated. The prices quoted by the British Broadcasting Corporation being as follows:—

				Nigerian F.A.Q.	Coromandels Decorticated.	Machine-dried
				£. s. d.	£ s. d.	
8.1.39	...	...	...	10 7 6	10 3 9	
15.2.39	...	...	...	10 12 6	10 7 6	
22.2.39	...	...	...	10 12 6	10 7 6	
1.3.39	...	...	...	10 12 6	10 8 9	
15.3.39	...	...	...	10 10 0	10 7 6	

AGRICULTURAL EDUCATION.

19. All Agricultural Officers report very enthusiastically on the school farms which have been made by the teachers who have attended the teachers' training course at Ibadan, and there is no doubt whatever that this scheme for training teachers will have far reaching results. A second training centre at Umuabia has been established and the first course there is now in progress.

20. The scheme for training farmers' sons as practical mixed farmers which has been inaugurated at Kafin Soli (Katsina) and financed by the Katsina Native Administration, is giving encouraging results. Twenty-eight boys attended the first course which has just been completed, and with two exceptions they are now established as mixed farmers either on their own or their fathers' farms. Groups of six boys are given a farm of twelve acres which is as similar as possible to a native mixed farm, and are provided with the usual livestock; bullocks, a cow, small stock, and implements. The pupils are therefore actually learning farming, and not merely cultivating a plot. They do all the work themselves including the building and repair of houses and sheds. Those who have not attended an elementary school receive an hour's instruction daily in simple farm arithmetic. Forty-eight boys are attending the second course.

21. There are also three excellent school farms in the Niger Province and a scheme for establishing boys from these schools on suitable farms is now being considered by the Bida Native Administration.

MAINTENANCE OF SOIL FERTILITY.

EXTENSION WORK WITH GREEN MANURING.

22. There is at last some evidence that farmers are beginning to appreciate the value of green manuring and that they no longer regard it as a fad of the Agricultural Department. In 1938, fifty-three farmers adopted the system as against fifteen in 1937. In the Ogbomosho area several farmers have put larger acreages under green manures and a number of farmers have been found growing mucuna quite independently, from seed obtained from their friends. Those who grew a green manure as a preparation for tobacco have had excellent results. There are also signs of interest in the Oyo area, and one farmer has started in the Oshogbo area. As he is regarded as a first class farmer his efforts are likely to be a very effective demonstration. In addition, there seems little doubt that farmers are making more use of cow peas to prevent soil wash, and are thus attempting a modified form of green manuring which they are working out for themselves.

EXPERIMENTAL WORK ON GREEN MANURING.

23. As a result of two somewhat unfavourable seasons we had begun to think that the fertility of the plots at Moor Plantation which had been continuously cropped since 1921 was beginning to fall. But crops in 1938 were excellent and showed clearly that there is no justification for such fears. The yield of yams and maize for the years 1926 and 1938 are given below for comparison:—

Year.		Net yield of yams.	Yield of early maize lb. dry grain per acre.
1926	...	4,494	1,691.
1938	...	6,557	1,427.

24. The Moor Plantation experiments have shown conclusively that neither weeds nor non-leguminous plants are as effective for maintaining fertility as mucuna; but although mucuna has been so successful it seems probable that the final solution of the soil fertility problem in the Western Provinces will be a combination of green manuring and animal husbandry. It is significant that in an experiment carried out at Ilorin mucuna eaten off by tethered cattle was as effective as mucuna burnt and dug in as judged by the yield of the succeeding crop. If therefore the green manure crop can be used to produce meat or work, and as a result the fertility of the soil is not impaired, we have taken a big step forward for the main objection to straight forward green manuring, namely the labour required to dig it in, is thus removed. This requires further investigation.

25. At Umuahia we have now reached the definite conclusion that under a system of intensive cropping fertility cannot be maintained for more than three or four years by annual green manuring. Of the various crops tested for this purpose wild crotalaria gave the best results. Results with calopogonium have been conflicting and in one experiment fertility was maintained for eight years, but the most recent results from a carefully controlled experiment illustrate the steady fall in yield which occurs even when the calopogonium cover is excellent and the

land is not exposed to washing. The experiment was conducted on land which was cleared from high bush in 1934 and the cropping was early maize followed by calopogonium each year. The yields of maize were as follows:—

1934	...	...	...	1,606 lb. dry grain per acre
1935	...	...	...	944 „
1936	...	...	...	1,044 „
1937	...	...	...	218 „
1938	...	...	...	161 „

As the washing and leaching are probably the main causes of loss of fertility calopogonium has its use as a protective cover crop but it must be regarded purely as such and not as a green manure.

26. Experiments have also shown that a one year calopogonium cover is inferior to a tephrosia fallow of similar duration. Recent results show that on land which is capable of growing good fallows of natural bush, the latter are superior to tephrosia. This is certainly true of fallows up to two years duration. Unfortunately land that is farmed out will not support even a good bush fallow. When it is left uncropped only a poor cover of grass and weeds develops. On such land, however, tephrosia fallows of four years or over will restore fertility. The shrub *acacia* *barteri* will also restore fertility on such land and an experiment is now in process to ascertain the relative values of *acacia* and tephrosia. *Acacia* has the advantage that it can be established on land which is too poor even for tephrosia, and it has been extensively planted by the people on these poorer lands to prevent erosion in some places and to restore fertility in others. By means of *acacia* fallows it may be possible to reclaim some of the “desert” lands, that is, land where fertility has fallen far below the cropping level.

27. The importance of these results lies in the fact that by the use of either tephrosia or *acacia* fallows fertility can be restored to all but the very poorest and most infertile of land. *Acacia* once established can be coppiced and after a cycle of cropping will regenerate itself and the stumps and roots help to prevent erosion. On the poor lands of the Eastern Provinces we are doing everything we can to accelerate the progress of planting *acacia* fallows, a procedure which in some places has already been adopted by the people themselves without our advice. In the last two or three years hundreds of acres have been planted, and this shrub is now a feature of the landscape in parts of the Onitsha Province. We are also carrying out a series of experiments to ascertain the best methods of treating the fallows and the extent to which the shrub can be continuously cut back without weakening its power of regeneration.

FARM YARD MANURE.

28. The work with tephrosia and *acacia* does not entirely solve the problem of soil fertility in the Eastern Provinces for although these plants will restore fertility to cropped out land they do not provide for the maintenance of soil fertility under intensive cropping. In the thickly populated areas this is achieved by the people themselves on their compound lands by the use of household refuse and human excrement but the area so manured is very small. The solution lies

with the use of farm yard manure. In 1938, the quantities of farm yard manure available were adequate to enable us to carry out large scale experiments both at Umuahia and on a block of very poor land at Ahiara voluntarily lent to us by the people themselves in order that we might be able to carry out experiments on soil fertility. The results of the year's experiments confirm the value of farm yard manure on all crops and under all soil conditions on which it has been tried. The results of one such experiment are given below:—

	1937 yams—lb. net per acre.	1938 maize—dry grain per acre.
Average yield of nine control plots unmanured	1,792	489
Average yield of four plots receiving 2 tons F.Y.M. annually	+735 ± 388	+158 ± 40.5
Average yield of four plots receiving 4 tons F.Y.M. annually	+1,261 ± 388	+424 ± 40.5

29. A still further increase in yield was obtained by the addition of lime to plots receiving farm yard manure but this effect was more marked on maize than on yams. The results at Ahiara were most striking and the people stated that they had never before seen such a heavy crop from this land. The result of this experiment which also included artificial manures is given below. The experiment was laid out as a latin square and cropped with yams:

Treatment.	Net yield yams in lb. per acre.
Control—no manure	5,083
4 tons F.Y.M. per acre	6,716
4 „ „ „ „ and 10 cwt. quicklime ...	8,786
3 cwt. super and 10 cwt. quicklime	6,210
5 „ „ basic slag	5,267
5 „ „ „ „ and 10 cwt. quicklime	5,842

Further information is still required as to the most economic dressing of farm yard manure, and as to its residual effects. Experiments on these points have already been commenced.

FUTURE WORK IN THE EASTERN PROVINCES.

30. After many years of experimental work and a series of disappointments we now have a definite solution for the soil problem in the Eastern Provinces. We know that fallows of acioa will restore fertility to worn out land and that farm yard manure will maintain a high level of fertility under intensive cropping. We therefore have a straightforward problem namely how to adapt this knowledge to a system of farming which the people can adopt. Although there are many difficulties we are confident that they can be overcome. Our system must of necessity involve the keeping of livestock, *i.e.*, mixed farming, and the first problem is how the necessary animals are to be provided and fed. Experience to date indicates that if animals resistant to trypanosomiasis can be provided the question

of feeding will not be as difficult as we originally anticipated. As will be shown later in this report the introduction of animal husbandry has an important bearing on the oil palm problem. In order to make the most effective use of the animal manure which is at present available from the existing livestock a comprehensive programme of experiments with various types of compost has already been initiated and the work on animal husbandry at both Umuahia and Onitsha has been increased. If composts prove to be as effective as they are claimed to be we shall be in a position to start extension work with them very shortly.

31. It is an interesting fact that in spite of the wide diversity of soil and climatic conditions which exist in Nigeria, and in spite of the fact that we have approached the problem of soil fertility from several different angles we are forced back to the conclusion that sound farming throughout the whole country depends upon a combination of crops and livestock. In view of this conclusion the importance of the stock farm at Ilorin cannot be over-estimated.

SOIL FERTILITY IN THE BENUE PROVINCE.

32. In the more densely populated parts of the Tiv Division of the Benue Province the situation is almost as serious as in parts of the Onitsha and Owerri Provinces for although the population is not so thick in actual numbers the farming system of the Tiv is much more extensive. Among such primitive people progress can only be made in small steps. While the final solution must eventually be a system of mixed farming we are at present concentrating on methods of improving the fallows. If this can be accomplished the next step would appear to be to incorporate a green manure crop in the local rotation. Pigeon peas have given encouraging results as a fallow improver, but before making any recommendation we have laid down a series of experiments to test them against improved grass fallows and ordinary spear grass fallows.

CHEMICAL WORK.

33. The satisfactory progress made with our studies of soil fertility during the last few years has been made possible by the very close co-operation of the Chemical Section with the Agricultural Officers who have conducted the field experiments, and the very broad view of the function of the soil chemist taken by the Senior Agricultural Chemist. In view of the increasing number of requests which are annually received for soil analyses to be made, his views on this subject are worthy of record. He writes as follows:—

“ The Chemical Section should work in the closest co-operation with all other sections of the Department, *i.e.*, Agricultural Botanists, Entomologists, etc., and any work which is required by them must receive priority. It must be realised that there are great limitations to the usefulness of soil analyses. It can certainly give some idea of the type of soil and can give some information on the siting of a new farm area. In extreme cases, *e.g.*, the alkaline soil at Nguru, it can prevent the acquisition of useless land. On the other hand the individual differences in the fertility of plots on a soil type are rarely revealed by soil analysis and much disappointment has been felt from past failures in this respect.”

ANIMAL HUSBANDRY.

PROGRESS OF MIXED FARMING : NORTHERN PROVINCES.

34. As with most other lines of work low prices have had their effect on the progress of mixed farming and our extension work has undergone a period of very severe testing. The fact that it has survived and that continued progress has been made is therefore very satisfactory. As will be explained in subsequent paragraphs our own mistakes have been fully shown up and we have had to modify some of our ideas. It is rapidly becoming clear that our effort to introduce mixed farming not only involves the teaching of a new form of agriculture, but also the inculcation of the idea of thrift, and this is a point which we cannot afford to overlook. The number of mixed farmers in the Northern Provinces and the rate of progress is given in the following table:—

Year.	Number started during the year.		Failures during the year.	Total continuing at the end of the year.
1928	...	3	—	3
1929	...	9	5	7
1930	...	13	3	17
1931	...	31	4	44
1932	...	71	7	108
1933	...	84	19	173
1934	...	139	14	298
1935	...	348	25	621
1936	...	474	41	1,054
1937	...	445	66	1,433
1938	...	325	156	1,602

35. The number of new mixed farmers actually started namely 325 was rather less than in each of the three preceding years. Produce prices have fallen to such a low level and so reduced the income of the peasant that having paid their taxes prospective mixed farmers have had difficulty in finding the small deposit which is required before they can be issued with cattle and implements. Also we ourselves required a breathing space to enable us to liquidate the cattle in the pools which were purchased at high prices just before the fall commenced, as we felt that it would be unwise to start new farmers with a larger advance than was necessary. The price of cattle fell from £3 to £4 per head in 1937 to £1 10s. to £2 per head in 1938. We now realise that for us to attempt to obtain a regular, and even rate of progress is unsound. We must extend when cattle prices are low and consolidate when they are high, as it is unwise to inflate the initial advance by the issue of high priced cattle. We must similarly avoid issuing high advances when produce prices are falling.

36. The number of failures is comparatively high but we have taken advantage of the reduced number of new men thoroughly to investigate the position of each individual farmer and to comb out those who were not making a success of mixed farming, or who required excessive supervision. In February and March we discovered that in all areas many of the village heads had sold their cattle.

These men having been written off have therefore helped to swell the numbers of those shown as failures. This sale of cattle was not due to loss of interest in mixed farming as nearly all the individuals concerned wish to obtain cattle and start again. It was due to the fact that for various reasons, often as a result of their trading activities in groundnuts, these men got into financial difficulties over their tax money and had perforce to sell their cattle to realise ready cash. Owing to the need for the utmost economy in the use of the funds available for transport we were also forced to close down some farmers in inaccessible places and we are now concentrating on those areas where the available supervision will benefit the greatest number of people. It can safely be said that the peasant farmers remaining on our books are all making good progress and are likely to be successful. A policy of concentration was hardly possible in the early stages as it was essential to accept any farmer who was willing to give the system a trial. As there is nowadays no dearth of applicants we can pick and choose and can concentrate on certain villages with the result that in one or two villages, *e.g.*, Bomo near Zaria most of the farmers are now mixed farmers and supervision is extremely easy. The need for close individual supervision in the early stages is most important and success depends very much on the African staff. The following extracts from a report on his farmers by an Agricultural Officer, illustrates the varying capabilities of farmers with whom we are dealing:—

- (i) “ the two best peasant farmers in the area. They have plenty of
“ manure in excellent pens, fat cattle and smiling faces.”
- (ii) “ An old hand who manages to do everything he is told by halves.
- (iii) “ An old hand who has a knack of doing everything the wrong way.
“ He however paid off his advance.”
- (iv) “ A Fulani village head who became a mixed farmer more with the
“ idea of increasing his herd rather than for farming. Will be closed
“ down.”
- (v) “ Started in 1937 and has done well. His difficulty is that he lives in
“ sandy country and has no suitable building earth. He therefore only
“ made a temporary pen.”
- (vi) “ A first class farmer. He paid off his advance a long time ago and
“ now has a cow and two calves in addition to his working bulls which
“ he keeps in a pen.”
- (vii) “ Has been closed down. He has paid nothing for two years and has
“ not paid even his cattle tax this year so there was no alternative.
“ He was very sad at being parted from his cattle.”

37. An excellent start has been made in the Niger Province and sixteen farmers were set up in the Bida Division during the year. Tsetse fly is the chief difficulty here and we are quite content to progress slowly. A scheme for improving rural water supplies by the provision of good wells in even the smallest hamlets about to be inaugurated by the Native Administrations will be of great assistance to us it will mean that the cattle will not have to visit the streams for watering, and risk of infection with trypanosomiasis will therefore be minimised. The farmers who have already started seem to be very ready to accept our advice and all are doing well.

CATTLE POOLS.

38. As described in last year's report when the fall in cattle prices occurred towards the end of 1937 we found ourselves overloaded with high priced cattle which have since had to be liquidated. We also made the fundamental mistake of purchasing young immature animals with a view to keeping them in the pools until they were suitable for issue to farmers. This was done in order to obtain them cheaply, but they proved to be very expensive purchase, for young animals are comparatively susceptible to red water and losses from this cause resulted. Outbreaks of foot and mouth disease and pleuro pneumonia also occurred in the pools and caused further losses. The pool system broke down because the pools were allowed to become too big, and also because they were used as stock farms without the essential equipment and supervision which is necessary for such work. Where herds of Fulani cattle exist we cannot hope to compete with the Fulani herdsman in rearing work animals, for as he has no overhead charges and the food for his stock costs little or nothing he can afford losses among his young stock better than we can. In spite of all the difficulties one or two of the pools notably Katsina and Daura succeeded in avoiding losses and actually made a small profit. The net loss on all pools amounted to £450, *i.e.*, four and a half per cent on the total capital involved which in view of the severe fall in prices cannot be regarded as unduly excessive especially as in these matters we must expect to have to buy some of our experience.

The whole pool system has now been reorganised. The number of cattle in each pool at any one time has been limited to just the number which will meet immediate requirements, and the pools have reverted to their original function which was to provide facilities for inoculating and training cattle prior to their issue to farmers. No attempt is now made to feed surplus or unsuitable animals throughout the dry season. If they are not required for mixed farmers they are disposed of at once.

ACCOUNTS.

39. We are greatly indebted to the Audit Department for their efforts to provide us with a system of accounts which is both simple and reasonably fool proof. Its assistance and advice has been invaluable. An Agricultural Officer, who has made a careful study of the system so recommended has recently visited each of our stations in order to ensure that every officer is fully conversant with it. It is hoped that the adoption of the new system will prevent incidents such as that which occurred in Sokoto where an African Assistant misappropriated funds received from farmers' repayments and funds given to him for the purchase of cattle. It also provides for the annual valuation of pool cattle so that these can always be issued at their true market value; one year's losses being offset against another year's gains. It also includes in one system of accounts the whole financial history of each beast from the time of its purchase from the Fulani until it is finally paid for by the mixed farmer. Farmers have naturally found it difficult to raise the money for the repayment of their advances, and considerable latitude has been allowed but most of them have made a commendable effort to repay as much as possible.

THE FARMER'S WIFE.

40. In almost all parts of Nigeria apart from her domestic duties the farmer's wife also plays an important part in agriculture and often her particular duties such as weeding and sowing are clearly specified. In addition in the Northern Provinces, she often owns the goats and chickens while in parts of the Eastern Provinces, she owns the hens but her husband owns all the males produced by them. In the North also she often owns cows which may or may not be parked out with a neighbouring Fulani herd. She normally controls the use of the "dusa" (guinea corn bran) which is an essential part of the ration for most forms of livestock so that the condition of the stock is dependent on her. Sometimes she owns a small farm which may for example be used to supply groundnut seed for her husband's farm if he for any reason has none. This is an aspect of extension work which has not hitherto been fully appreciated by us. It is an important matter which must be taken into consideration in connection with the extension of mixed farming and particularly in any attempt to improve the livestock of the country. It explains to some extent the difficulty which we have encountered in getting farmers to follow our advice with regard to the care and feeding of cows, and it seems possible that when we are in a position to issue improved cows we shall have to devise a scheme by which they are issued to the farmer's wife instead of to the farmer himself, if they are to be properly fed and cared for. We shall certainly have to consider the women in connection with our work on goats and sheep.

41. For obvious reasons it is not an easy matter to carry out the investigations which will enable us to obtain accurate information, but the question is receiving attention and is being studied on our demonstration farms where the labourer's wife is now paid for her share of the work. The labourer's wives on these farms are also being given instruction in milking.

MANURING.

42. We have always found it somewhat difficult to persuade the farmer to make a suitable pen and to keep his cattle in it at night with a view to making the maximum quantity of manure, and it is probable that the assumption which we made that the farmer fully understands the value of manure was hardly correct. He understands that manure applied in large quantities which can be seen on the fields is of value, but he does not understand that the small quantities which we recommend can do very much good. He therefore still tends to depend on kraaling and merely regards the manure made in the pen as a negligible contribution which he therefore applies to a very small area. We now regard the provision of a suitable pen as an essential qualification for the issue of cattle and implements, and the need for spreading measure and the value of small dressings will be much more fully demonstrated and explained. There has however been a very marked improvement in this respect during the last two years.

IMPROVEMENT OF COWS.

43. The table given below gives the milk yields of the Gudali and white Fulani herds at the Shika stock farm and at Samaru.

Year	No. of complete lactations	Average period between calves	Average No. of days in milk	Average yield per day between calves
WHITE FULANI HERD				
1930	3	391	168	2.42
1934	42	406	261	4.76
1935	47	363	278	6.52
1936	58	352	227	6.25
1937	51	354	235	7.03
1938	68	354	232	6.76
GUDALI (SOKOTO) HERD				
1933	3	—	—	2.42
1934	11	541	288	3.81
1935	19	369	235	5.72
1936	25	373	245	6.29
1937	24	357	242	8.40
1938	27	358	243	8.10

44. The above figures indicate that there was a slight set back in 1938. This was however foreshadowed in last year's report and was almost entirely due to the high proportion of first lactations. Thus twenty of the sixty-eight white Fulanis, and six of the twenty-seven Gudalis were the first lactations of home bred stock. That the set back is more apparent than real is shown by the record of five home bred white Fulani cows which in their second lactation averaged 8.91 lb. of milk per day. A further fall will probably occur in 1939, but by 1941 when the first real effects of selective breeding should become apparent we may look for the commencement of a further upward swing. We have now reached the stage when bull selection must receive the closest possible attention. The average period per day between calves and average days in milk seem to have reached fairly constant figures for each breed. This means that under the system of feeding and management which we have adopted the cows are reproducing as frequently and yielding for as many days and in such quantity as their inherent capabilities permit, and further progress will largely depend upon the ability of the bulls to transmit high milking qualities.

45. Our breeding programme received a slight set back through the loss of some twenty-one calves all under six months of age following inoculations for rinderpest. As these inoculations are essential the possibility of such losses cannot be disregarded.

FOODSTUFFS AND FODDERS.

46. That it is unwise to depend too much on one type of food was demonstrated at Shika when the sweet potato crop on which all our present rations are now based was severely attacked by the weevil "Cylas" Puncticollis causing a loss of some forty tons of tubers. We are therefore giving much more attention

to cassava and to the need for a more effective rotation of crops at the Shika stock farm. Entomological investigations are being carried out to ascertain means of controlling this pest.

47. While we are doing our best to work out rations which are independent of the use of cotton seed the latter is still an important part of the rations in use on our bigger farms, and the purchase of seed makes a serious inroad into our depleted funds. I therefore wish to express my very sincere thanks to the trading firms for having agreed to assist our work by supplying cotton seed for the feeding of cattle on our farms free of charge.

48. Pigeon peas continue to give promising results at all stations and they are particularly valuable in the very dry areas of the extreme North. At Kano pigeon peas ratooned in October provided another cut of new growth early in December, and small quantities of further growth were cut throughout the dry season. Goats will eat both the green leaves and pigeon pea hay fairly readily but cattle take some time to accustom themselves to doing so. Experience at Maigana however shows that once they have acquired a taste for pigeon pea leaves they will eat them readily.

49. Another fodder plant which is promising at Kano is Elephant Grass (*Pennisetum purpureum*). This grass is indigenous and wild in Nigeria up to about latitude 10° N. but the type now being tested was introduced from abroad several years ago. It has already shown great promise at Zaria as a succulent fodder and the fact that a small plot established on very ordinary soil at Kano last July has easily survived the dry season encourages us to hope that treated as a perennial it will prove to be of real value.

MINERAL FEEDING EXPERIMENT.

50. After thirteen months there is no difference in weight between the group of animals receiving minerals and those without. This corroborates the results of a previous similar experiment carried out in 1931. The present experiment is however designed to test the value of a mineral ration from the calf stage until the heifer has completed her first lactation and in this respect it continues where the previous experiment comes to an end. The real results of this experiment will be obtained at the end of a further two years.

EXPERIMENTAL WORK.

51. In view of the success achieved with stall feeding at Maigana and the resulting increase in manure production, on every farm however small we are concentrating on the problem of keeping the livestock on the farm all the year round. This we believe is an essential preliminary to the issue of improved cows. The economics of the farm and the system of cropping must be so adjusted that it will provide all the essential food for both the family and the livestock and also provide a reasonable proportion of saleable produce. Until this can be done there is little hope that improved cows will be sufficiently well fed to enable them to keep up the milk yield of which they are capable. In working out these systems we are making more and more use of experimental unit farms and we now regard these as an essential link between the experimental farm and the farmer.

THE ILORIN STOCK FARM.

52. The establishment of both the central farm and the unit farms were completed during the year but owing to lack of funds some of the unit farms in the Ilorin Province will merely be farms on paper for a year or two. The unit farms however cover an even wider range of conditions than was originally contemplated for the scheme has been extended to include the Southern Provinces, and units have been established at Oyo, Ibadan, Abeokuta, Agege, Benin, Onitsha and Umuahia. In addition to their value for testing the resistance of the cattle to trypanosomiasis these unit farms are being used to work out systems of farming suitable for the districts in which they are situated.

Ten bulls, seventeen cows and heifers and three calves of the Fouta Malinke, or N'Dama breed were purchased in French Guinea early in 1939 and they arrived safely in Nigeria in February, 1939. These cattle are of the long horned type, and in colour are of varying shades of dun. Occasionally polled cattle are seen among them and one cow of this type was purchased. The officer who visited French Guinea to purchase these cattle again received from the French authorities all possible assistance and was able to obtain some excellent specimens of the breed. After their arrival they settled down quickly and improved in condition. Three calves have been born to date.

53. The cattle from the Gambia which were purchased last year have not done as well as either the Gold Coast or the Fouta Cattle, being slow to accustom themselves to their new environment. All animals have at various times recorded rises in temperature and one bull sent to a unit farm succumbed to trypanosomiasis. Two other bulls would have died had they not received treatment. The remaining animals however recovered without treatment and four of the stud bulls are now in excellent condition and are working regularly. The Gold Coast shorthorns maintained their condition throughout the year on both the central and unit farms although during the difficult time of the year when trypanosome infection is high (October to December) most of the young animals ran very high temperatures. The older animals did not seem to be affected. Three of the new Gold Coast animals died on unit farms, and one of the deaths was definitely diagnosed as due to trypanosomiasis. These animals were however of a very inferior type. Young bulls sent from Ilorin to Ibadan have done as well there as at Ilorin. The four original bulls have again worked regularly and have averaged seventy-seven hours work per month.

54. Of the sixty-one living calves born at the farm since 1936 only four have died and it is interesting to note that these four were all the progeny of one bull (Gold Coast No. 7); the remaining progeny of this bull also appear to lack constitution. Twelve out of the thirteen Gold Coast calves born during the year were found to have trypanosomes in their blood in one case when ten days old. The fears expressed when the scheme was started, that on the central farm trypanosome infection would be inadequate appear to be without foundation.

55. There is already some evidence that by using Gold Coast bulls on our dwarf cows it will be possible to effect a considerable improvement in the local Southern Nigerian cattle. These of course are all very small, but vary from

animals having a perfect conformation to animals showing all the signs of dwarfism. The progeny of such crosses which are now nearly adult compare very favourably in size with the smaller Gold Coast cows and there is little doubt that when these animals are again mated with Gold Coast bulls their progeny will be almost indistinguishable from the pure Gold Coast type, all signs of dwarfism being eliminated.

GOATS.

56. The work with goats which is being undertaken on all our farms in the Northern Provinces is progressing steadily and we are gradually learning how to manage them so that they will be a real asset to the farmer instead of being a menace to crops and all other forms of vegetation. That they are extremely useful as makers of manure has already been shown and experiments with goat compost are being started this year.

LIVESTOCK AT UMUAHIA.

57. In view of the importance of livestock to the Eastern Provinces our experience at Umuahia is of particular interest. The local dwarf cattle have done very well indeed. The mortality among calves during the year was nil and although most of the animals showed rises of temperature only one, a young bullock purchased in Benin in 1937 actually developed active symptoms of trypanosomiasis and had to receive treatment.

Casualties among sheep however reached a very high figure. Out of a total of forty animals there were nineteen deaths all of which were due to trypanosomiasis. Worm infection has not been serious and no other serious disease occurred. It is doubtful whether such serious losses occur among native owned sheep, but our flock is kept under particularly unfavourable conditions and the incidence of tsetse flies is unusually high for this area.

58. The death rate among pigs was also high, and the Veterinary Department has diagnosed the disease to be trypanosomiasis caused by *T. Simiae* which is very virulent in pigs. Both pure native pigs and the latter crossed with middle and large white blood are susceptible, but certain individual native pigs appear to have a high resistance. One native sow of exceptionally good type which is one of the foundation pigs purchased in September, 1934, still survives and has always maintained excellent health and condition without any veterinary treatment. She is the only survivor of the native pigs purchased before 1938 and all animals now in our herd with the exception of three which were purchased recently are her descendants. In view of this our policy at present is to attempt to select from native pigs a strain possessing high resistance.

POULTRY.

59. An organisation for meeting all demands for Rhode Island Red birds is gradually being built up, and arrangements have been made for the introduction of new blood each year, thus three cocks were imported in 1936, six in 1937 and

three in 1938. Progress with poultry was undoubtedly slowed down for a few years due to the fact that our introduction were purchased from highly bred pedigree stocks and which under Nigerian conditions showed a decided lack of stamina and vigour. We hope for better results now that we are importing ordinary barn yard fowls but we are still encountering difficulties in our breeding flocks and the possibility that our general policy with regard to introducing English poultry needs revision has not been overlooked.

60. The demonstration pens on our own farms show that the three-quarter R.I.R. quarter native cross is greatly superior to the half bred and but little inferior to the pure bred bird at the same time being more hardy. Arrangements are now being made at one of our stations to attempt improvement by selection from among the local fowls combined with good feeding and management.

THE OIL PALM INDUSTRY.

61. The continued steady fall in the price of palm oil has made the task of encouraging the planting of palms still more difficult. It is particularly unfortunate that this period of very low prices should have occurred just when the earlier plantations are coming into bearing. These early privately owned plantations are in fact demonstrations, and on their success much depends, both from the point of view of convincing the farmer of the value of the planted palm and of the integrity of purpose of the Government. Many of them were originally made in face of considerable opposition and against public opinion and as the farmers themselves said their neighbours laughed at and ridiculed them. Unfortunately at the most critical moment low prices have put the scoffers in the position of being able to say "I told you so". In spite of this it is noteworthy that the farmers do not dispute the superiority of the planted palm, but merely complain that as a result of low prices the oil palm as a cultivated crop does not pay. In areas such as parts of Benin where both rubber and cocoa can also be grown, and the returns from these crops can be compared with that from the oil palm, this argument cannot be refuted especially if the owner has to employ hired labour. As might be expected at this stage, many of the planters are the more enlightened members of the community such as teachers, salaried officials, traders, and tradesmen, and such men invariably do employ hired labour. Every effort is of course being made to induce the ordinary farmer to plant a small plot of palms of such a size that he can work it himself without extra labour. It is only in this way that he will be able to reap the advantage which family labour, and consequent low overheads, give him over the large plantation system. We are also doing all we can to concentrate the plots as much as possible in order that when they come into bearing the owners will be able to co-operate in the use of machinery.

62. The Agricultural Officer, Umuahia, reports that the deep seated suspicion of the motives of the Government in encouraging palm cultivation which has been so widespread in the past appears to decrease very slowly if at all and still constitutes one of the main barriers to progress in many districts. This was confirmed by Mr. Bridges one of the Administrative Officers who as mentioned in last year's report was detailed to investigate the difficulties which are preventing accelerated progress.

63. Another effect of low palm prices is that the standard of maintenance of plots is again tending to deteriorate. From our point of view this is a serious matter for it is important that the majority of plots should be well enough maintained to ensure that the results are satisfactory, otherwise the effect on future planting will be serious. It is however satisfactory to be able to record that many plots, especially in the Benin Province, are extremely well cared for and are excellent demonstrations of what a palm plantation should be.

PALM PLANTING.

64. The following tables show the total area of palm plantations including replaced groves made and maintained by African owners since this work was started in 1928. Plots which are not satisfactorily maintained or have subsequently been abandoned are included in these figures.

CULTIVATED OIL PALM PLANTING AND GROVE REPLACEMENT IN NATIVE OWNERSHIP.

	Total No. of owners.			Total area acres.
On December 31st, 1928	6			21
" " " 1929	27			119
" " " 1930	53			236
" " " 1931	85			352
" " " 1932	218			691
" " " 1933	382			1,014
" " " 1934	704			1,457
" " " 1935	1,382			2,498
" " " 1936	2,278			4,172
" " " 1937	3,557			6,588
" " " 1938	4,667			8,730

65. It is interesting to compare the progress made in Nigeria with that made by the French in Dahomey. In an article recently published in the *Revue de Botanique Applique et d'agriculture Tropicale* it is stated that "The Agricultural Department has made plantations of selected palms since 1933. The natives are not interested in these plantations. Neither propaganda nor advice has succeeded in making them believe in the value of planting the oil palm. In all a total of 5,000 acres have been planted between 1933 and 1937 but it is doubtful whether many of the planted palms still exist." It is significant to note that in 1937 in Dahomey the system of paying a subsidy of one-quarter franc per selected palm planted was introduced and this has had a considerable effect in arousing enthusiasm.

66. The progress made in each province is shown in the following tables:—

OIL PALM PLANTING.

PROVINCE	1928-37 (Net Total excluding abandonments to end of 1937)		1938		1928-38			
	Owners	Acres	New Owners	New Plots and Exten- sions, acres	ABANDONED		NET TOTAL	
					Owners	Acres	Owners	Acres
Benin ..	1,584	4,025	425	1,207	145	224	1,973	5,182
Warri ..	81	190	44	92	3	9	125	282
Owerri ..	838	1,123	223	410	99	83	1,019	1,508
Calabar ..	429	486	182	199	133	161	567	636
Onitsha ..	428	535	215	238	124	99	587	729
Ogoja ..	30	22	12	7	21	12	28	23
Colony ..	7	4	5	4	—	—	12	8
Abeokuta ..	69	47	145	90	7	8	213	136
Ijebu ..	6	3	8	10	5	3	10	13
Oyo ..	55	74	28	86	44	41	65	145
Ondo ..	3	5	17	14	2	2	18	17
Totals	3,530	6,514	1,304	2,357	583	642	4,617	8,679

PALM GROVE REPLACEMENT, 1938.

PROVINCE	NET TOTAL		New Owners	New Plots Extension	ABANDONED		NET TOTAL	
	Owners	Acres			Owners	Acres	Owners	Acres
Benin ..	6	15	—	—	8	27	6	15
Owerri ..	3	13	—	—	2	13	2	3
Calabar ..	30	31	17	11	12	43	46	33
Totals	39	59	17	11	22	83	54	51

NOTE:—Figures in last year's Report amended.

Previous to 1935 the area planted almost doubled itself each year and although we could not achieve similar results in 1938 the acreage planted was only a little less than that planted in 1937, which in such difficult circumstances is quite encouraging.

67. In spite of low prices and a bad planting season a further 1,200 acres were planted in the Benin Province and although some parts of the Benin Division have probably almost reached their limit, there is evidence that interest in oil palms is steadily growing in the Ishan Division where it is being stimulated by clan rivalry. There have been many complaints from Benin of damage to young seedlings by rodents and in some plantations the losses from this cause have been very high. This matter is however being dealt with, and where the trouble is serious arrangements have been made for protecting the seedlings with collars of

wire netting. The presence of an Agricultural Officer in the Warri Province is beginning to have its effect. The acreage of planted palms was increased by ninety-two acres to a total of 282 acres. This increase is largely due to awakening of interest of the Itsekiri tribe twelve of whom planted thirty-five acres in 1938.

68. In the Eastern Provinces progress has been as great as can be expected. An Agricultural Officer is now permanently posted to the Calabar Province and it is hoped that this will stimulate further interest among the people in this area. At the end of the last planting season there seemed good prospects that planting would quickly gain momentum in the Bende Division of the Owerri Province, but although it was one of the best areas, and the area planted was increased by 194 acres progress was not up to our expectations. It is probable that in view of the fall in prices the more cautious farmers are waiting to see the results of the efforts of earlier planters. In this division a high proportion of the planters are full time farmers or people who mainly depend on farming. In the Onitsha Province the area planted increased by 238 acres of which 120 acres were in the Onitsha Division.

69. Investigations to ascertain whether palms can be successfully grown on the poor grass land in the Northern parts of the Okigwi and Bende Divisions were continued. If palms can be successfully established on such land they will be a useful means of preventing soil erosion. Trial plots have also been established in the Igala Division of the Kabba Province and in the Idoma Division of the Benue Province.

70. In the Abeokuta Province rather more interest than formerly has been shown, and in 1938, ninety acres were planted. The most striking progress was made at Aiyetoro (Iaro Division) where no extension work had been attempted until this year. Forty-one farmers planted twenty-two acres, and other plots would have been planted had not the rains ceased earlier than usual. Now that a Senior Agricultural Assistant has been permanently posted to the Ijebu Province there is some evidence that progress may be anticipated there in the near future.

SUPPLY OF SEEDLINGS.

71. For the first time since extension work with palm planting was commenced the supply of seedlings was more than adequate to meet all requests and there was a surplus at the end of the season. The organisation of both central and Native Administration nurseries has now been perfected and works smoothly. We now feel confident that we shall be able to meet all future demands. The nurseries contain some 566,000 seedlings which are ready for planting in 1939, and arrangements for the 1940 supply have already been made. We are now attempting to induce farmers to raise their own seedlings. Seedlings which have only just germinated are being sold very cheaply, and farmers are being taught how to plant and tend them until they are ready for transplanting into the field.

REVIEW OF POSSIBILITIES IN THE SOUTHERN PROVINCES.

72. Critics of the Government's policy in connection with palm planting have in the past appeared to assume that palm plantations on a considerable scale are possible throughout the Southern Provinces. This however is emphatically not

the case, and as a result of our experience during the last few years and the assistance received from Mr. Bridges' able report we have recently been able to clarify our ideas on this subject. Our conclusions can be summarised briefly as follows:—

Western Provinces.

(i) Much of the Oyo Province is outside the palm belt, and palms will flourish only in sheltered valleys.

(ii) In the Colony, Abeokuta, Ijebu and Ondo Provinces, oil palm planting is possible and land tenure does not appear to be an obstacle, but oil palms have to compete with cocoa and kola and at present the people greatly prefer these crops. Palm oil for local consumption is imported into these provinces from other parts of the country.

(iii) In Benin oil palm planting has made excellent progress, and given a reasonable price for the produce may be expected to continue. It is at present faced with serious competition from rubber and also from cocoa where the soil is suitable for this crop.

(iv) In the Warri Province while land tenure, communal ownership and the system by which the trees are hired out to Sobos are obstacles, it seems that these can gradually be overcome, but in this province probably as a result of the presence of the United Africa Company's rubber estates, rubber is a strong competitor. Among the Itsekiris palm planting may go ahead where suitable land is available.

Eastern Provinces.

(i) In the real palm belt of the Calabar Province the existing groves are so thick that it is questionable whether further plantations are necessary. Palm grove replacement appears to be our only line of action here, and this is not likely to be popular until as a result of our breeding work we can evolve very superior palms with which to replace the existing ones.

(ii) In the very thickly populated areas in Onitsha and Owerri Provinces (Orlu District, South Okigwi, North and East Owerri) palm plantations on any scale are out of the question. All available land is cultivated for food crops and the farm lands already carry as many palms as are in the circumstances possible. The existing palms are in effect cultivated. Here again we can do little until we have superior palms with which to replace the existing ones.

(iii) In most of the Onitsha Province, northern Bende, and much of the Okigwi Division, the problem is not so much pressure of population in actual numbers, but that the soil is inherently poor and eroded, and good land is limited to the comparatively small areas around the compounds which can be manured. In such land the conditions are similar to those in the thickly populated areas. Outside these compound areas there is only poor grassland. Some of this grassland may grow palms but this has yet to be determined. As palms would be very valuable on such land we are investigating this point as rapidly as possible. But we have always found it very difficult to obtain land for trials in these areas and we have to rely on school plots or native

owned plots over which we have little control. This grassland is often under communal ownership and custom does not allow individuals to use it for planting.

(iv) In sparsely populated areas (South-west Owerri, Southern Aba and Ahoada Division) there is plenty of land and there is no obstacle to planting from this point of view, but here the people seem to lack the initiative possessed by the inhabitants of the thickly populated areas where living conditions are more difficult. They tend to hire labour for farm work and to hire out their palm bush to Sobos.

(v) In the remaining areas such as the Umuahia District and parts of Calabar there is no shortage of land and no serious obstacles to palm planting, but owing to the system of land tenure it is difficult to ensure that planting is sufficiently concentrated to make the eventual use of power machinery a real possibility.

OIL PALM RESEARCH STATION.

73. The above conclusions in addition to showing that the area available for plantations is limited, also show clearly that the proposal to establish an oil palm research station was fully justified, for our experience has now shown us that propaganda to encourage the planting of palms as an isolated line of extension work is not enough, as it does not meet the needs of the people. While our policy must be adjusted to suit the conditions pertaining in each area, what is required everywhere is a system of farming which will provide the people with an adequate supply of food and will make the returns from palm plantations compare more favourably with those from crops such as rubber and cocoa. Such a system can be evolved only as a result of research, but we believe that it is possible and that we have already made considerable progress in this direction. It depends firstly upon the provision of improved types of palms which will increase the yield per acre, and we already know that in this direction there is almost unlimited scope. Secondly it depends upon the use of palm plantations for producing meat and manure both of which are so urgently needed in the Southern Provinces. We must ascertain the spacing of palms which, while giving a high yield of oil and kernels will also allow grass, or such crops as centrosema, to grow beneath them thus providing food for livestock. In turn the livestock will produce meat and if penned at night manure for food crops. These are the problems on which we are now concentrating our main efforts, and the provision of a special research station will enable us to tackle them much more effectively and rapidly than we are able to do at present. In the meantime we are receiving the utmost assistance from the plantations of the United Africa Company. The manurial and cultural experiments which they have already laid down at our request will be invaluable to us in a few years' time. The Managers of these plantations have also placed at our disposal their records and their accumulated knowledge of oil palm cultivation, and their help and friendly co-operation are very greatly appreciated.

74. In spite of the present financial stringency genuine progress towards the establishment of the research station has been made. With the assistance of Administrative Officers, the Benin Native Authorities, and the Forestry Department a very suitable site at Ekiadolor twenty miles from Benin, has been secured

and I wish to thank all concerned for their assistance in this important matter. With the funds available we have been able to survey the site, make a serviceable road, provide quarters for African staff, and a rest house for Europeans. We have also cleared sufficient land (forty acres) to enable the Botanist's 1939 planting programme to go forward as laid down. Detailed estimates of the cost of establishment, and of the maintenance of the station for the first five or six years have been drawn up, and assistance from the Colonial Development Fund has been asked for. In the meantime the Government has been able to provide funds to ensure the continuance of the selection programme during 1939-40.

THE OIL PALM SELECTION PROGRAMME.

75. Considerable progress was made with the selection programme during the year, and particularly with our attempts to widen the field of selection. As a result, during 1938 a further fifty-six acres of selected palms were planted. These selections were made partly from the Aba palm plots, and partly from selected and unselected "Lisombe" trees on the United Africa Company's estate at Ndian. Here again I wish to thank the United Africa Company for their valuable assistance. Fifty acres of the area established in 1938 were planted at treble the normal density so that the actual number of selected palms planted was approximately 9,000. This close planting method of establishing oil palm selection plots has been adopted at the Yangambi station in the Belgian Congo, and it has the merit that the available land is used more economically, since palms which are not likely to be of use can be eliminated at an early age, and yet leave the final normal density of palms in the plot.

76. Selections have now been made from four different sources namely Calabar, Aba and Ndian, and from a small quantity of "Deli" palms, the seed of which was introduced from Sumatra a few years ago. The approximate acreage and number of stands planted with seedlings from these selections to date is as follows:—

	No. of stands.	Acreage.
Calabar progenies	4,982	79.5 acres.
Lisombe progenies from Ndian ...	6,290	45.7 ..
Aba progenies	3,666	31.2 ..
Deli	102	2.0 ..
Total	15,040	158.4 ..

77. Thus there are now available in Nigeria over 15,000 useful palms most of which are progenies of trees which have passed a preliminary selection test for yield and fruit type. Every effort is being made to investigate the natural resources of Nigeria in order to find superior types from which selections can be made, and we have made arrangements by which controlled pollination can be effected on even the tallest trees. Efforts are now being made to obtain seed of promising strains from other oil palm producing countries for it is felt that only by examining the whole range of material available anywhere in the world will the maximum progress in selection be made.

78. Work has already been commenced on a further selection area at Umunebo-Ufuma in the Onitsba Province. This area contains an unusually high proportion of thin shelled trees and there are also a number of trees of the "Dura" (Deli) type in it. The latter are likely to be very useful for selection and seed supply, and yield recording has been commenced on them.

79. At Ndian the United Africa Company have commenced individual yield recording on approximately 3,000 Lisombe progenies, 1,000 Calabar progenies and 1,000 Deli palms as a preliminary to further selection. This is an immense task the value of which cannot be over emphasised.

THE DELI OIL PALM.

80. Further consideration has been given to the prospects of the Deli palm which has proved so successful in the East Indies. The only extensive plantings of this type are on the United Africa Company's estates. Studies carried out by the Botanists at Ndian Estate, through the courtesy of the United Africa Company, have shown that the Deli palm must be considered as a distinct type. In addition to a number of distinctive vegetative and fruiting characters it appears to have a markedly lower percentage of oil in the pericarp than Nigerian types. In general it also grows and yields poorly and is very susceptible to disease. The Deli palm does not therefore offer much prospect of success in Nigeria. We do not consider the matter as closed, however, and in order to further our researches we have recently arranged for a fresh supply of selected Deli seed from the Malayan Government for planting at the Oil Palm Research Station. Although the Deli palm has failed elsewhere a small plot of this type at Moor Plantation has yielded extraordinarily well, and we are carrying out further plantings at Ibadan to see whether the Deli palm is perhaps more suited to drier conditions.

81. Local palms of fruit composition similar to that of the Deli palm, that is, of the "dura" type, seem to hold out greater possibilities of success and we are giving attention to this matter. Many palms of the "dura" type occur in Nigeria, and these local "dura" palms do not suffer from any of the defects of the imported Deli. Further there is no reason to believe that they would give rise to sterile progeny. The investigations at Ndian showed that the proportions of pericarp and kernel in the progeny of naturally pollinated thin-shelled types and the Deli (dura) type were very similar. As regards fruit type, therefore, there is no disadvantage in planting seed of the "dura" type. As we know superior wild palms of this type exist in Nigeria we hope by extensive search in wild palm groves to bring them to light and breed from them.

STERILITY IN OIL PALMS.

82. The problem of sterility in oil palm, the seriousness of which was not at first fully appreciated by us, has received considerable attention from the Botanists during the year. So called sterile palms produce apparently normal male and female inflorescences. The female flowers open normally and commence to set fruit in the usual way, but the young fruits never contain a shell, and after a month or so the fruits die and rot off. While an occasional fruit bunch on a sterile tree is carried through to normal maturity the average yield from such palms

is negligible. All the earlier planted progenies of the Calabar selections have now been examined for sterility. It has been found that in the progeny of self pollinated thin-shelled oil palms sterility occurs to the extent of about twenty per cent on the average, although there appears to be a certain amount of variation from selection to selection. No sterility has been found in the progeny of self pollinated hard shelled palms, but in the Lisombe type with natural pollination under ordinary plantation conditions sterility amounts to about ten per cent.

83. This is a serious matter from the point of view of extension work if the confidence of farmers in our selected palms is to be retained. One farmer who had received 110 seedlings of our selected Calabar progenies reported that eighteen had turned out to be sterile.

84. Methods of dealing with the sterility problem are being carefully studied. At present all we can do is to replace sterile palms which are produced from our seedlings free of charge. Fortunately our selection work has not been entirely confined to thin-shelled types. We have some useful selected thick-shelled material available which should prove extremely valuable either for crossing with thin-shelled types or for re-selection in an effort to avoid sterility. It is in fact by no means certain that the thin-shelled types are those which are best suited to African owned plantations and we still have an open mind on this point.

85. Various other methods of dealing with the problem are being considered. These include the possibility of recognising sterile palms in the seedling stage in order that they may be rogued from the nurseries, and a study of the correlation between parental characters and the proportion of sterility in the progeny. A physiological investigation of characters of sterile palms has already been commenced.

OTHER BOTANICAL INVESTIGATIONS.

86. The usual routine investigations in connection with the selection programme have been continued. These include yield recording, determinations of fruit type, analysis of the composition of the fruit from the Calabar progenies and observations on growth and flowering. In this connection an experiment carried out at Benin to ascertain the effect on subsequent yield of preventing the flowering of young palms has to date given interesting and unexpected results. The trees were planted in 1924, and on thirty-two trees the flowers were removed over a period of four years prior to November, 1934, while on the remaining thirty-three trees normal fruiting was permitted. The results to date may be summarised as follows:—

	<i>Weight of bunches in lb. per acre.</i>			
	<i>1935.</i>	<i>1936.</i>	<i>1937.</i>	<i>1938.</i>
Average yield 32 palms flowers removed ...	4,959	2,119	1,820	1,810
Average yield 33 palms normal fruiting ...	4,699	4,342	3,784	3,471

The very low yield from the trees from which the flowers were pruned was quite unexpected and recording is being continued.

PALM PRESSES.

87. In addition to the problems described in paragraph 82 we fully appreciate that a further means by which the oil palm industry can be assisted is by improving the methods of extraction and preventing the waste of oil which occurs when native methods are used. Hitherto we have concentrated on an attempt to popularise the hand press, but it is hoped that we shall shortly be in a position to test the small power mill recently produced by the United Africa Company. While we recognise that the power mill is the ideal, we also realise that even if a suitable small mill is evolved, this ideal will have to be reached in steps of which the use of the hand press is the first. Further, in view of the difficulty in connection with the communal ownership and control of harvesting of palm bush, by which fruit can only be harvested on set days, the final solution in some areas may be a mobile power unit which can be moved from community to community rather than a series of fixed mills. It is understood that such a unit is actually being marketed by a French firm and has proved successful in the French Colonies. We hope therefore to give it a trial as soon as funds permit.

88. The increase in the number of presses in use since 1932 is shown in the following table:—

Palm Oil presses bought by Native owners.

No. of presses.				No. of presses.			
At December 31st, 1932 ...	58	At December 31st, 1936 ...	390				
.. .. , 1933 ...	76	 , 1937 ...	734*				
.. .. , 1934 ...	100	 , 1938 ...	834				
.. .. , 1935 ...	180						

*Corrected figure.

89. The sudden increase in the sales of presses in 1937 led us to hope that the use of the press was really becoming popular, but low oil prices were responsible for the very big drop in sales in 1938. Many of the machines already sold lay idle for comparatively long periods. The owners of presses cannot usually make a profit by buying fruit for the presses, as the market price of fruit approximates very closely to the value of the oil and kernels which it contains (the labour of extraction by native methods apparently being valued at nil) and without a premium for quality the extra oil extracted by the press at present low prices barely covers working costs. Similarly the press owner who charges a fee for pressing has also had difficulty in making the press pay; for the pressing rate has been forced down to twopence per tin or equivalent measure of fruit and such a figure is too low for economic working. Presses therefore continue to be most popular in semi oil areas where by the use of the press the premium for soft oil over semi is easily obtained.

90. In the Onitsha Province however towards the end of the year presses were being set up in the Ihiala area, where previously the people opposed their introduction and this is now a busy centre for press extraction. This was formerly a hard oil area but as a result of the presses the firm established at Uzokwa is now buying soft and edible oil. In the Owerri Province most of the presses went to

the Okigwi Division. There has undoubtedly been an improvement in the quality of the oil produced by the press owners. With low prices the premium for the better grades is higher in proportion and every extra penny is worth striving for.

COCOA.

91. During the last ten years the production of cacao in Nigeria has been almost doubled having risen from 49,000 tons in 1928 to approximately 91,000 tons in 1938. The people of the South-western Provinces are therefore becoming more and more dependent upon it to the exclusion of all other crops even of food crops. Despite the low prices in recent years extensive planting still continues. Large areas have been planted in the Benin Province in the last year or two—although much of this owing to unsuitable soil may do very little good—and the cultivation of cocoa is also extending in parts of the Eastern Provinces wherever the soil is suitable. Thus in the Bende Division and in the Aro-Chuku District we have received repeated requests from farmers for advice and assistance in cocoa planting and cultivation, and in 1938 our assistants supervised the planting of thirteen acres and twenty-eight acres in these areas respectively.

92. There is thus no indication whatever that maximum production has yet been reached but we do know that the soils on which cacao will thrive are strictly limited and that there are no great tracts of suitable forest land awaiting exploitation. We also know that certain areas of older cacao are becoming less productive, the trees within such areas showing marked die-back, and that this process is progressive. Deterioration usually begins to take place when the trees are from twenty to twenty-five years old. This admittedly does not apply to all cacao and there are plantations near Ibadan which are known to be nearly fifty years old in which some of the original trees are still bearing good crops.

93. We therefore feel that we cannot afford to neglect research on cacao and that we must try to increase the efficiency of production. To omit to do so will inevitably eventually result in reduced exports and the lowering of the standard of living of some 4,000,000 people. Our policy in this matter is quite clear and we are working in two main directions one of which is purely agricultural and the other plant breeding. Our problems on the agricultural side may be briefly summarised as follows:—

- (a) how to keep good cacao from deteriorating;
- (b) how to rejuvenate farms which are already deteriorating;
- (c) how to re-establish cacao on farms where it has completely died out.

On the first of these problems we have so far been able to do very little work, but the second and third are now receiving attention.

94. The problem of the plant breeders is to ascertain whether it is possible to breed a better type of cacao which will fetch a higher price in the world's markets, while at the same time retaining the hardiness and high yield of our present type. It is even possible that hardiness and yield may be increased. The agricultural and plant breeding aspects of the problem of efficient production are of course concomitants; thus artificial manures which may well be uneconomical if used on low quality cacao may pay handsomely if used on cacao of high quality.

CACAO REJUVENATION.

95. As a preliminary step yield recording of individual trees has been carried out on thirteen native owned plots in the Oyo Province. Of these, nine were commenced in 1938 including one plot at Oshogbo. The work at Agege described in last year's report has also been continued. Experiments on a small scale have also been carried out on two plots of old cacao at Moor Plantation. On one of these plots the possibility of rejuvenation of old trees by the encouragement of basal suckers is being tried and seems likely to be successful. On the other, the covering of all bare patches of soil with a grass mulch has had a marked beneficial effect on the cacao. It is particularly noticeable in the second plot that cacao in the shade of a patch of mature rain trees is more healthy than adjacent exposed trees which are rapidly dying out. The shaded portion is however on a patch of whitish sand and on the same plot where a lateritic soil occurs unshaded cacao is growing and yielding satisfactorily. These small experiments provide us with a sound basis for rejuvenation experiments on native farms when the opportunity for carrying them out occurs.

96. Observations have suggested that one of the fundamental factors causing die-back on these two plots is the water status of the soil in the dry season. The Chemists and Botanists are carrying out investigations to test this point and to ascertain the relative moisture content of exposed soils and those under a cacao canopy. Samples are being taken fortnightly to a depth of six inches and twelve inches under each set of conditions. A large number of surface profile samples taken from cacao plantations in the Agege-Ilaro area, the Ibadan-Ife area and near Benin and at Bende also indicate that while extreme acidity and the usual accompanying poverty in mineral nutrients is detrimental to cacao, yet it is the physical condition of the soil and its ability to hold moisture which is the major factor in determining whether soils are suitable for cacao in Nigeria.

CACAO BREEDING.

97. Until Cacao Research Station at Tafo is able to supply us with proved material the main function of our breeding programme will continue to be the introduction, trial, and subsequent selection of introduced varieties for while our ordinary Nigerian cacao (*Theobroma Leiocarpa*) which is characterised by small flattish beans which are purple in cross section, undoubtedly gives high yields and a very uniform product, yet there are no grounds for assuming that it is the type of cacao most suited to Nigerian conditions; and there is every reason why we should endeavour to find better and more hardy varieties. Our position with regard to this work has been strengthened by the return of one of the plant breeders from the Cacao Research Station at Trinidad to which he was seconded for two years. While there, he was able to ascertain which types of cacao showed most promise of succeeding under Nigerian conditions and has accordingly arranged for these types to be introduced. An account of the introductions already made was given in paragraph 92 of last year's report.

98. The possibility of selection from among our own types has not been overlooked and the first step in our selection work was to select particularly high yielding local trees. Progeny trials from these selected trees were laid down and are now coming into bearing. It is too early yet to say whether the superior yields

of the parents will be inherited. It is interesting to note that we have found no signs of loss of vigour as a result of using self as opposed to cross fertilized seed.

BUTTER CONTENT OF CACAO BEANS.

99. In connection with the breeding programme an investigation has been carried out jointly by the Chemists and Botanists to study the possibility of increasing the butter fat content of cacao beans. No significant differences in fat content could however be found among a number of Nigerian trees. The investigation has however shown that there is a definite seasonal variation in the fat content of the beans. During the main crop season (September to December) the fat content of dried nibs exceeds fifty-five per cent of fat, while at the end of the light crop season it drops to less than forty-five per cent. It was found also that fermented beans contain on an average about 1.5 per cent more fat than unfermented beans. In view of the importance of the cacao butter to the industry it is therefore a little surprising that the American contract does not differentiate between fermented parcels, and parcels containing a high proportion of unfermented beans.

KOLA.

100. Railings of kolas to the Northern Provinces in 1938 were rather less than in 1937 being 20,742 tons as against 22,376, while imports fell from 278 tons in 1937 to 157 tons. The total railings of kolas from the Western Provinces to the North and the imports of kolas in recent years are given below:—

Railings of Kolas to the Northern Provinces.		Imports of Kolas.	Railings of Kolas to the Northern Provinces.		Imports of Kolas.
1932 ...	11,020 tons.	1,260 tons.	1936 ...	16,290 tons.	285 tons.
1933 ...	12,011 "	875 "	1937 ...	22,376 "	278 "
1934 ...	17,222 "	56 "	1938 ...	20,742 "	157 "
1935 ...	15,966 "	153 "			

An interesting feature of this trade is the reduction in the railings from Agege and the increase from stations higher up the line. Thus while railings from Agege fell from 8,497 tons in 1937 to 6,295 tons in 1938, railings from Ibadan rose from 2,360 tons to 3,069 tons and those from Oshogbo from 156 tons to 213 tons.

101. Owing to the low prices ruling at the commencement of the season, no doubt largely due to lack of demand in the North caused by low produce prices, certain farmers at Agege attempted to enforce price control. Farmers were instructed not to sell kola below the rate of two shillings and sixpence per 200 nuts (Grade I). The normal price for this time of the year is approximately ninepence to one shilling per 200 nuts of this quality. This attempt to control the marketing of kola was as dangerous to the farmer's own interests as it was ill-conceived, for had it been successful it would have tended to increase the production of kola elsewhere and to accelerate the shifting of the centre of activity from Agege to stations further North which has been slowly taking place for some years. Further, had the promoters of the scheme been successful in persuading farmers to hold up their crop for any considerable period, heavy losses from wastage in storing would certainly have resulted. In the early stages this attempt received the sympathetic support of farmers in the district and for a short period there was an appreciable decrease in the volume of trade conducted from Agege. It gradually broke down however and the marketing of the crop proceeded normally.

102. As a result of this attempt to control prices the Agricultural Officers at Kano and Agege made an effort to improve the marketing at Agege by selling direct to an agent in Kano. Two consignments have recently been sold by a group of farmers in this way with some success, but if any progress is to be made it is essential that producers should become amalgamated into a properly constituted society conducting regular weekly sales. Certain difficulties peculiar to the kola trade, notably the danger of a boycott, in Kano, may militate against the rapid development of this system. Nevertheless there is no reason to believe that such difficulties are necessarily insurmountable, and every encouragement will be given to farmers who wish to give co-operative marketing a further trial.

RUBBER.

103. An interesting feature in the trade returns during the last few years has been the steady increase in the export of rubber. The figures from 1932 to 1938 are as follows:—

	Quantity. lbs.	Value. £		Quantity. lbs.	Value. £
1932 ...	1,893,711	31,362	1936 ...	4,866,882	90,137
1933 ...	2,256,322	33,089	1937 ...	5,763,983	126,055
1934 ...	3,612,584	44,488	1938 ...	7,022,971	135,797
1935 ...	4,611,920	61,572			

The quantity exported in 1938 was the highest ever recorded although the value has been exceeded on many occasions.

104. In the early days of the Agricultural Department the encouragement of rubber planting was regarded as one of its main lines of work. Plots were established at several places in the Southern Provinces and many thousands of seedlings were regularly distributed. The fall in the price of rubber led to a discontinuance of this policy in 1921, and since then although the Department has always been prepared to give advice, and to instruct farmers in the correct method of tapping no active encouragement to planting has been given. While some planting undoubtedly took place between that date and 1936 it was not on a very extensive scale. Since 1936, however, the very low prices paid for palm produce have encouraged the planting of rubber on an extensive scale particularly in the Benin and Warri Provinces and there is every indication that it is spreading to other provinces. It seems likely therefore that the production of rubber will continue to increase during the next few years.

105. The quality of the native produced rubber is reported to be poor, but it is clear that the African farmer has learnt the way to produce a marketable product. Many farmers have their own smokehouses and the sheets are made by the use of hand rollers. Both the United Africa Company and the Bata Shoe Company also hire trees and do their own tapping, the rent per tree varying from twopence to fourpence per annum.

106. The exporting firms have recently been offering from four and a half pence to fivepence per lb. for native produced rubber and at this price rubber gives a gross return of approximately £6 per acre as against a return of £3 to £3 10s. per acre at most from planted oil palms,

BEAN INVESTIGATIONS.

SOUTHERN PROVINCES.

107. Since 1928 the Department has been trying to produce an improved form of "Popondo" bean (*Phaseolus lunatus*) which would give a seed suitable for export. The seeds exhibit a yellow discolouration of the testa, and this blemish is unacceptable in European markets. Numerous crosses between "Popondo" and other varieties of *Phaseolus lunatus*, which have pure white seeds but are otherwise inferior, have given completely negative results. Since "Popondo" is not generally popular with the native farmer, and would only be taken up extensively if its seed were exportable, it has been decided to discontinue this line of work altogether.

108. More promising results have been obtained with cowpeas. In the earlier years it was found impossible to grow cowpeas for successive seasons in the same plots because the soil became "cowpea sick". This has been attributed to the marked susceptibility of cowpeas to root knot, a disease caused by the eelworm (*Heterodera marioni*). In 1935 a large collection of cowpea varieties was obtained from the Royal Botanic Gardens, Kew. From this material it has been possible to isolate seven selections which, together with one local selection previously made, will yield satisfactorily and remain green throughout most of the dry season when grown in a piece of land which is thoroughly infested by the root knot eelworm. These selections will now be multiplied for extended trials.

109. In 1937 a number of varieties of Soya beans were obtained from the United States of America, Malaya and British Guiana. Most of them have not been successful, but British Guiana Creole shows considerable promise. A suitable selection from this variety would give the farmer a late season legume, producing an exportable crop and work in this direction is being continued.

COTTON.

NORTHERN PROVINCES.

110. Purchases of American seed cotton for export since 1929-30 expressed as bales of lint of 400 lb. net are as follows:—

				Seed distributed Tons	Cotton bought Bales	Price paid per lb. of seed-cotton	
						d.	d.
1926-27	..	..	..	3,372	16,659	1 $\frac{1}{8}$	— 1 $\frac{3}{4}$
1927-28	..	..	..	2,220	16,316	2 $\frac{3}{8}$	— 2 $\frac{1}{2}$
1928-29	..	..	..	2,640	24,686	2 $\frac{1}{4}$	— 2 $\frac{1}{8}$
1929-30	..	..	..	3,173	34,389	1·6	— 1·2
1930-31	..	..	..	2,719	13,849	0·5	— 0·8
1931-32	..	..	..	1,569	4,811	0·6	— 0·8
1932-33	..	..	..	1,674	22,228	0·8	— 0·9
1933-34	..	..	..	2,376	23,013	0·8	— 1·2
1934-35	..	..	..	3,807	50,022	1·1	— 1·5
1935-36	..	..	..	5,170	49,793	1·1	— 1·6
1936-37	..	..	..	5,170	39,272	0·8	— 1·5
1937-38	..	..	..	4,910	23,714	0·6	— 0·8
1938-39	..	..	..	4,476	18,556*	0·7	

* Estimated.

The effect of low prices on the purchases of cotton for export are shown by the decline from 4,900 bales in 1935-36 to 18,000 bales in 1938-39. As in the previous year the light rainfall during the early part of the cropping season caused a good deal of late planting, but cotton sown in good time produced an average yield. The local weaving industry again absorbed a considerable proportion of the crop and farmers who sold their cotton in the local markets received a much better price than those who sold in the export markets. It is probable that the export of seed cotton to French territory was greater than usual. It is satisfactory to note that in spite of falling prices the production of cotton in the Kontagora Emirate is steadily increasing, and the British Cotton Growing Association has now established a small power ginnery at Kontagora Town.

111. The trend of prices since 1935-36 has been very similar to that which took place between 1929 and 1932 but fortunately purchases have not fallen to the low levels of 1930-31 and 1931-32 when they declined to 13,800 bales and 4,800 bales respectively. It now seems likely that the lowest part of the curve has been reached and that there may be increased production again this season, for shortage of groundnut seed has given rise to an unprecedented demand for cotton seed for planting.

ENTOMOLOGICAL INVESTIGATIONS.

112. A survey of the insect pests on Allen cotton sown on both May 17th and July 7th was made throughout the season. The early-sown cotton had two flowering cycles, with peaks on August 27th and November 19th respectively, but as a result principally of bug and bollworm attack only 42 lb. seed cotton per acre (fifty-five per cent stained) were obtained from bolls derived from the first cycle, while 320 lb. per acre (six per cent stained) were harvested from second-cycle bolls. The July-sown cotton had only one flowering cycle with a peak on November 19th, and gave a yield of 258 lb. per acre (four per cent stained). The increase in atmospheric aridity in early November was accompanied by a marked decrease in insect abundance so that the second-cycle bolls escaped serious damage. On the other hand, the growth of the plants sown in May was markedly superior to that of those sown in July. These results confirm the view generally held by Agricultural Officers that in the Zaria-Bauchi, Southern Katsena belt cotton should be sown as early as possible after the corn crops have been established, *i.e.*, at the first opportunity after mid June.

113. A study was also made of the means by which the various pests tide over the dead season, and it was found that old cotton growing in fadamas was an important factor in pest survival. Arrangements are therefore being made to ensure that the regulations for the uprooting and burning of old cotton are more strictly complied with.

SOUTHERN PROVINCES.

114. The purchases of improved Ishan, and native cotton in recent years are given in the following table:—

NATIVE COTTON			IMPROVED ISHAN		
	Bales of 400 lb. lint	Prices		Bales of 400 lb. lint	Prices
1930-31	312	$\frac{3}{4}$ d. falling to $\frac{1}{2}$ d. (2)	4,289	$\frac{3}{4}$ d. falling to $\frac{1}{2}$ d. (1)	
1931-32	4	$\frac{1}{4}$ d. " $\frac{3}{4}$ d. (3)	1,333	$\frac{1}{2}$ d. " $\frac{1}{2}$ d. (3)	
1932-33	4	Not quoted	860	$\frac{1}{8}$ d. " $\frac{1}{2}$ d. (3)	
1933-34	118	$\frac{3}{4}$ d. (3)	2,884	$\frac{3}{4}$ d. " $\frac{1}{2}$ d. (3)	
1934-35	389	$\frac{3}{4}$ d. (3)	5,208	$\frac{1}{8}$ d. " $\frac{1}{2}$ d. (3)	
1935-36	+++	$\frac{3}{4}$ d. rising to $\frac{1}{2}$ d. (3)	8,132	$\frac{1}{2}$ d. rising to $\frac{1}{8}$ d. (3)	
1936-37	306	1d. " $1\frac{1}{2}$ d. (3)	5,428	$1\frac{1}{8}$ d. " $1\frac{1}{4}$ d. (3)	
1937-38	80	?	6,089	$\frac{1}{2}$ d. falling to $\frac{1}{8}$ d. (3)	

Purchases of Ishan seed cotton in 1937-38 exceeded our expectations, but purchases for 1938-39 will almost certainly show a substantial reduction. They will probably not exceed 2,000 bales.

GROUNDNUTS.

IMPROVEMENT OF GROUNDNUTS.

115. Botanical work in connection with groundnuts has been intensified during recent years, particularly at Kano, and promising results have been obtained. The strain "Castle Cary" has hitherto been the best of our improved strains, from the point of view of yield per acre but at Kano a new strain K.38 selected from seed introduced from Ceylon in 1928 has during the last four seasons proved itself to be superior to Castle Cary.

The following figures show the percentage increase in yield of both K.38 and Castle Cary as compared with the local type:—

			1935.	1936.	1937.	1938.
K.38	...	...	139%	111%	114%	123%
Castle Cary	...	...	131%	101%	110%	112%
Local type	...	...	100%	100%	100%	100%

K.38 is now being multiplied in order that it may be issued to farmers in the Northern belt in the place of Castle Cary.

116. Similarly a new strain, Samaru 38 which is superior to Castle Cary has also been provided for the Zaria area. This strain gives a yield of from ten per cent to twenty per cent more than the local type. It was distributed to one village this year and the farmers were quite satisfied with it. Arrangements for further distribution are now being made. In the meantime Castle Cary continues to be distributed in other areas.

RICE.

MANGROVE SWAMPS.

117. The visit of an Agricultural Officer to Sierra Leone last November has enabled us to clarify our ideas and to find an explanation for some of our difficulties, particularly that of falling yields. It is now clear that much of our

swamp is atypical of the Sierra Leone swamp, and there is need of a much more detailed survey of the mangrove swamps round Warri. Whereas a good swamp in Sierra Leone has a clayey loam type of soil, with a low percentage of sand and partially undecomposed vegetable matter, much of our swamp has a high proportion of undecomposed vegetable matter, a certain proportion of sand, and no clay. In spite of this a steady yield of 900 lb. per acre can be obtained on the Warri swamp and experiments have shown means by which this can be increased to from 1,200-1,500 lb. per acre. Actually none of the farmers who have tried growing rice in the swamps have complained about the yield—they merely say that the work is too hard.

118. Unlike the Scarcies area of Sierra Leone where there is a thick population on the high land overlooking the swamps the population in our mangrove swamp areas is very scanty. Thus while there are great possibilities for rice production in mangrove swamps, and they could easily produce rice for the whole of Southern Nigeria, there is little likelihood of spectacular progress in the near future.

UPLAND RICE.

119. There is also great scope for the growing of rain grown rice in Southern Nigeria. The people are obviously keen on it and it seems to be a very useful alternative foodstuff to cassava. We have therefore started experimental work with it, but the scope of this work is at present limited by lack of funds.

TOBACCO.

120. In 1933, at the request of the British American Tobacco Company we commenced an attempt to produce locally a tobacco suitable for cigarettes which could be manufactured in their local factory. The British American Tobacco Company were most anxious that this work should be pushed forward as rapidly as possible but in the early stages progress was of necessity slow as there were many difficulties and much experimental work required to be done. The work was commenced at two main centres namely at Ogbomosho in the South and at Maigana in the North. In the North the chief difficulty was that of handling the crop in the dry season while in the South it was difficult to obtain the requisite bright colour. In both areas the production of seedlings also raised difficulties.

These difficulties have now been largely overcome and both the quantity and quality of the tobacco produced has been increased each year. The rate of progress during the last few years is shown in the following table:—

NORTH				SOUTH	
No. OF FARMERS	AREA	PRODUCTION		AREA	PRODUCTION
	Acres	lb.		Acres	lb.
1934	3	$\frac{1}{4}$	134	83	10,000 (approx.)
1935	172	30 $\frac{2}{3}$	10,446	149	37,024
1936	252	52	14,975	280	74,224
1937	344	65	14,131	283	86,691
1938	492	102	52,000	576	398,000

121. The reports on this year's tobacco were very satisfactory, and although further improvement is possible it is now clear that we are producing a leaf which meets the requirements of the British American Tobacco Company. Further, the crop is profitable to the farmers and in those areas where we have encouraged them to grow it they now depend upon it for the payment of their tax. It is indeed unfortunate that just as we have now reached this very satisfactory stage the British American Tobacco Company should have decided that we are producing more tobacco than they require and have asked us to reduce the area grown. This will undoubtedly cause disappointment among the farmers. It now appears that some 300,000 lb. is the limit which the British American Tobacco Company can take and further progress depends upon whether they can increase their sales of tobacco.

As we have put a great deal of effort into this attempt to encourage tobacco growing and have introduced several new varieties it seems worth while to continue experimental work for a year or two in order to see if we can produce a leaf which will meet the requirements of the Home market, especially as one of our plant breeders has had considerable experience of the crop elsewhere.

GINGER.

PRODUCTION FOR EXPORT.

122. This year has been a very difficult one for the ginger industry. The English market was very heavily overstocked with every variety of ginger, with the result that the prices offered in Nigeria were less than half those of last year, and the lowest on record. This resulted in reduced production for export, the final figure being 4,616 cwt. as compared with 6,354 cwt. in 1937-38. The drop in production was not as great as might have been expected as the information regarding the fall in price was not received until the beginning of the dry season. Growers were relying on their ginger to pay their tax, bride prices, etc., and it was realised that the amount of ginger in the ground was far in excess of the capacity of the internal trade, so that to have stopped curing would have rendered the whole crop almost worthless.

123. A comparison of the annual exports of cured ginger since the commencement of the industry is shown in the following table:—

1930-31	305 cwt.	1935-36	7,565 cwt.
1931-32	784 „	1936-37	6,847 „
1932-33	1,062 „	1937-38	6,354 „
1933-34	1,726 „	1938-39	4,616 „
1934-35	4,427 „		

124. The prices paid this season and in the two previous seasons were:—

	1939.	1938.	1937.
Grade I	1d.	2½d.	3d. per pound.
Grade II	¾d.	2d.	2d. „ „

No special grade was purchased this season as the quantity was insufficient to warrant a separate consignment.

125. The value of the crop fell to £1,795 as compared with £6,801 in 1937-38. In previous years growers had paid their tax, and a considerable margin left for their private use, but this year the receipts barely paid the growers' tax in many cases. The Kachia Jabas, who produced sixty-five per cent of the total crop, only received an average of approximately ten shillings per tax payer as compared with thirty-three shillings last year. The tax however remained the same.

QUALITY.

126. In addition to reduced production, the fall in price and our propaganda for shorter periods of washing, resulted in some deterioration in the colour of the crop; a slight decrease in the boldness of the crop was also noticed again this year. The fact that the very best ginger soil along the rich stream valleys has now been used, is partly responsible for the reduction in boldness, but probably the major cause is the use of inferior seed. Propaganda for the use of better seed is now being intensified, and the question of manuring and soil rejuvenation is being investigated. A comparative table showing the proportion of the various grades in the crops for the past three years is given below:—

		1939.	1938.	1937.
Special	... Not Bought	0.5%		1.0%
Grade I	...	52%	58.7%	71.8%
Grade II	...	48%	40.7%	27.2%

THE INTERNAL MARKET.

127. The price of green ginger for the internal market did not fall so steeply as the price of cured ginger for export; it remained fairly steady at one shilling and threepence per bag at the railway stations. The capacity of the Northern market for green ginger is expanding slowly but at present its limit is in the neighbourhood of 400 tons per annum. Had the demand been there, Southern Zaria could have supplied more than 800 tons of fresh ginger for the internal trade this year, but the railings were in fact very little in excess of 440 tons. Even at one shilling and threepence per bag the return is over £2 per acre for an average farm. There seems here to be an opportunity for the local production of ginger beer.

CHEMICAL ANALYSIS.

128. In last year's report mention was made of the complaints we had received with regard to the chemical analysis of the crop, the steps we had taken to rectify the deficiency, and the improvement we had achieved. We did not, however, succeed, in bringing the whole crop above the legal minimum laid down for the English market. Our main concern this season was again to increase the content of water soluble constituents and although we can report a progressive improvement, we have, once more, not been completely successful in all areas. Preliminary trials carried out before the curing season started confirmed the results of last year's trials, which showed that Nigerian ginger was well supplied with soluble constituents, and that our standard method of curing was sound. By this

method the ginger is immersed in water for six minutes at each washing, and observations had shown that during this period the penetration of water into the ginger is very slight. It is the extent of the penetration which controls the loss of soluble constituents, and this in turn depends upon the period of immersion. The control of this last factor, therefore, rather than the actual treatment of the ginger, is the important point.

129. To test the theory, advanced by an analyst in England, the soil exhaustion was probably responsible for the deficiencies of Nigerian ginger, samples were taken from old and new farms, and from average farms in a large number of widely separated centres. Analyses of cured and uncured portions of these samples were very satisfactory, and showed that the theory was quite groundless.

YELLOW GINGER.

130. In last year's report a new yellow strain of ginger was mentioned as a possible solution of the analytical deficiencies of Nigerian ginger, and our opinion about this ginger is still unchanged. Samples were shown to brokers and grinders in England in 1938, and they were unanimous in stating that it was vastly superior to ordinary Nigerian, and would be more readily saleable. Its most important quality however, is that it will cure to a very good colour after only half the number of washings required by the ordinary strain, and it is significant that all the yellow ginger brought to the markets has had an excellent analysis, and the bulk of it has been cured without supervision. The curing of yellow ginger has been discouraged during the past two seasons in order to allow of seed multiplication, but some ten bags were cured this year, and the United Africa Company have kindly agreed to send this to England as a separate consignment for special report. Multiplication of this strain is being pushed forward as rapidly as possible and seed distribution will commence next year. It is hoped that it will be possible to send a small experimental shipment of about ten to fifteen tons to England in 1941 to test the market.

EXPERIMENTAL WORK.

131. Experiments carried out with phosphatic manures were inconclusive, but indications were obtained which will be followed up during the coming season. A manurial experiment is being laid down by the Chemist to determine the fundamental requirements of the crop, and in addition various cultural trials and observations will be carried out at Kachia, together with a scheme of single hand selection work on yellow ginger. The question of the best method of growing the crop is still under investigation but meanwhile propaganda will be continued for the use of bold seed, spacing, and the better cultivation of the crop. That the use of bold seed is an important point is shown by the following results obtained from an experiment carried out at Zonkwa:—

Average yield of five plots sown with thin seed 445 lb. green ginger per acre.

Average yield of five plots sown with bold seed $+1531 \pm 108$ green ginger per acre.

CHILLIES.

132. During the last two or three years since the prices of crops such as cotton and groundnuts have been low there has been a very great increase in the production of chillies for the local market, especially in the Bida Division of the Niger Province where they are now an important field crop. A rough estimate puts the production in this area at from between 3,000 to 4,000 tons. In the past we have made collections of the various types of chillies grown in Nigeria, and have sent home samples of all promising types for valuation, but the results have so far not been promising. The Botanists are however hopeful of being able to produce an improved type which will be satisfactory for the home market.

133. This year two firms have exported trial commercial consignments but the results of these consignments are not yet to hand. It is interesting to note that competition from the internal trade forced them to pay as much as two and a half pence per lb. At this price chillies are an exceptionally profitable crop to the producer.

THE FRUIT INDUSTRY.

134. Substantial progress has been made during the year in connection with the development of the fruit industry. Our work in certain respects is now reaching the stage where it appears to offer scope for commercial development. The next few years will be a critical period during which the utmost vigilance must be maintained to ensure that our products do not fall below the standards demanded by the trade.

135. Meanwhile the internal trade in fruit continues to flourish although owing to a poor orange season and possibly also to low produce prices the total railings of fruit on both Eastern and Western lines from South to North were rather less than in 1937, being 388 tons as against 565. Relevant figures are given below:—

CONSIGNMENTS OF FRUIT FROM RAILWAY STATIONS IN THE ABEOKUTA AND OYO PROVINCES TO THE NORTH IN APRIL 1ST, 1938 TO MARCH 31ST, 1939.

			1937.	1938.
Coconuts	...	...	3 tons, 13 cwt.	2 tons, 11 cwt.
Oranges	...	...	18 „ 8 „	7 „ 6 „
Bananas	...	...	3 „ 8 „	1 ton 8 „
Pineapples	...	...	8 „ 5 „	3 tons 14 „
Mixed Consignments			11 „ 0 „	19 „ 5 „

RAILINGS OF ORANGES FROM THE OWERRI PROVINCE TO THE NORTH (JANUARY TO DECEMBER).

1934	...	...	170 tons, 14 cwt.	1937	...	...	490 tons, 0 cwt.
1935	...	...	203 „ 2 „	1938	...	...	342 „ 17 „
1936	...	...	350 „ 18 „				

FRUIT PIERCING MOTHS.

136. During the period April to June, 1938, twelve species of fruit piercing moths did a considerable amount of damage to citrus on Moor Plantation. "*Achaea lienardi*, Boisd." appeared in numbers in early April and was by far the most important species, only twelve specimens of "*Othreis* spp." being seen. During February, March and April, 1939, a very thorough search was made in the Ibadan area for the larvae of fruit piercing moths. One larva of "*Othreis divitiosa*, Wlk." was found. Not a single "*Achaea*" caterpillar was obtained although many of the known food-plants are present. In late March, a two day search of the forest reserve at Olokemeji (about twenty-two miles West of Moor Plantation) resulted in the discovery of two batches of "*A. lienardi*" larvae and one of "*Achaea faber*, Holl." In April and May, 1939, "*Achaea* spp." were very rare on citrus on Moor Plantation, whilst "*Othreis* spp." were more abundant than in 1938. Practically no damage was done until the second week of May and the total loss of fruit was very considerably smaller than in the preceding two years. Gunn traps and poisoned mangoes were found to be of little use against "*Othreis*"; but, owing to the small number of moths present, handpicking at night gave promising results.

GRAPEFRUIT.

137. The crop of Marsh seedless grapefruit on the Agege farm was sufficient to enable small trial shipment to be made regularly throughout the late crop season. The reports indicate that the eating qualities of our fruit compare very favourably with supplies from other countries, but its external appearance does not yet reach the very high standard required, and special attention will now be given to this point. While it is premature to make any definite forecasts regarding the future of the business, these shipments were promising. An average profit of one shilling and sixpence per case was realised on shipments marketed up to the end of December, 1938, the local price of the actual fruit being six fruits for one penny.

138. Meanwhile we continue to receive abundant requests from farmers for planting material and for help in laying out plantations. All prospective planters are warned against planting large areas and we have restricted the number of trees which are supplied to each applicant to a small number. In spite of this in the Oyo Province ninety-three new plots covering seventeen acres were planted in 1938 and in the Abeokuta Province forty-three new plots were planted. In the Agege area there is a noticeable tendency for absentee landlords from Lagos to take up grape fruit planting, but such requests are dealt with on their merits.

FRUIT JUICES.

139. As pointed out in last year's report the possibility of the establishment of a fresh fruit export trade will depend ultimately on our ability to dispose of surplus fruit which is not up to the export standard. In co-operation with Messrs. John Holt and Company the main problems in connection with the preparation and export of fruit juices are steadily being investigated and the results are promising. Experience has already shown however that the preparation and export of fruit

juice is a matter for European enterprise rather than for Africans for the success of the industry will depend upon the production of a standard product at the lowest possible cost. The results of our shipments to date indicate that grapefruit juice is the most profitable, followed by lemon juice and lastly orange juice. The green oranges grown from seedling trees on native farms have produced juice of satisfactory quality.

PINEAPPLES.

140. The cultural experiments carried out at Agege indicate that the combined effects of mulching and shade may prove to be the solution of the wastage problem which is at present handicapping the development of the export trade. The possibility of finding a use for the surplus fruit by the export of pineapple pulp is still being investigated.

DATE PALMS.

141. Throughout the drier parts of Northern Nigeria the date palm is grown in most towns and villages usually in or around the compounds. In some towns several hundred trees are to be seen and the value of the fruit is obviously appreciated by the people as they are prepared to take the trouble to pollinate the female inflorescences by hand, and to bag the developing fruit bunches to protect them from fruit bats. The local value of a bunch of ripe dates is from one shilling to two shillings and sixpence, but supplies are inadequate to meet the demand and are augmented by dates brought in from French territory.

142. As a result of enquiries by Agricultural Officers we have ascertained that several varieties of date palm are grown. Most of them produce fruit of a poor type, being small and woody. We have, however, discovered at least one type which produces fruit of excellent quality, and have this year obtained both some seed and a few suckers of this type. There seems to be scope for increasing the cultivation of the date palm with a view primarily to meeting the local demand but with the possibility of establishing an export industry later on. Arrangements have therefore been made to establish plots of date palms of the best local type on all our farms and farm centres in both the Northern and Southern Provinces, and enquiries are being made as to the possibility of introducing improved varieties.

CASSAVA MOSAIC.

143. The mosaic disease of cassava was first recorded in Nigeria in 1926. It is caused by a virus and is transmitted from infested to healthy plants by a species of white fly (*Aleurodidae*). The effects of the disease are variable; in its severe form it can reduce the yield of tubers by as much as one-third or one half. Mosaic was probably introduced in infected cuttings from another part of Africa. It was first seen in the coastal areas, and is now gradually spreading through the Middle Belt towards the Northern Provinces. Conditions appear to be particularly favourable for the disease in the coastal regions, since there it spreads most rapidly and produces the most severe symptoms.

144. In 1932 the Department undertook a programme of work for the production of cassava varieties which would be resistant to mosaic disease. A collection of all the Nigerian types was made, and promising material was

introduced from the Gold Coast, Sierra Leone and Trinidad. From these it has been possible to breed hybrid varieties which show a high degree of resistance, give good yields, and are apparently suitable for local market requirements. In 1938 the field scale trial of some of the new hybrids at Agege gave the following results:—

Selection.	Calculated Yield per acre.	Selection.	Calculated Yield per acre.
CH 28	9.0 tons of tubers	CH 50	11.3 tons of tubers
CH 128	10.6 „ „ „	Local Type ...	7.2 „ „ „
CH 61	9.7 „ „ „		

Additional hybrids produced here, together with hybrids obtained from the Gold Coast Department of Agriculture, are undergoing preliminary trials at Ibadan and Agege.

ECONOMIC GARDEN.

145. A collection of perennial economic crops was commenced at Moor Plantation in 1933 and is being continued as opportunity offers. The principle underlying this collection is to have a few plants of each of the more valuable species growing under observation, and to be in a position to supply seed or planting material should we be called on to do so at short notice. Perennial crops which are already receiving detailed consideration by the Department are not included.

146. Although introductions play an important part in this collection, we have also planted a few stands each of certain trees and shrubs already found in Nigeria, though some of these might have been introduced in the past. We have recently introduced such potentially valuable crops as Kapok, Tonka beans, and superior varieties of Cashew nuts, and have established such local plants as Raphia, Annato and Shea nut trees. But the collection is not confined entirely to plants of possible export value, species yielding edible fruits or of use in native medicine have also received attention.

AGRICULTURAL SHOWS.

147. An agricultural show was held at Lagos as early as 1903, and since then others have been held from time to time at places such as Ibadan, Calabar, Kano and Katsina. These shows were however very large, and were held at irregular intervals, and it is doubtful whether they served any useful function from the purely agricultural point of view.

148. This year as an experiment a start was made with village and district shows in the Kano and Zaria Provinces. A village show only was held at Maigana, in the Zaria Province, but in the Kano Province village shows were held at three separate villages and subsequently followed by a district show at Karaye in the same area. We propose to continue holding similar shows in these places annually and if they prove to be of real value from the point of view of agricultural improvement gradually to work up to provincial shows. There was every indication that the village shows were a success and that they were appreciated by the people, but the district show was rather too big to be finished in one day. The

future of village shows will of course largely depend upon the ability of the Native Authorities to carry out the preliminary organisation with a minimum of supervision.

149. A praiseworthy attempt by Canon Lenon to organise an Agricultural Show at Ikare in the Ondo Province unfortunately had to be abandoned owing to an outbreak of small-pox.

WEST AFRICAN AGRICULTURAL CONFERENCE.

150. The third Conference of West African Agricultural Officers was held in Nigeria from June 2nd to June 25th, 1938, and general sessions were held at Moor Plantation, Ibadan, in the Southern Provinces, and at Samaru, Zaria, in the Northern Provinces. It was attended by ten officers from the Gold Coast and four from Sierra Leone; and forty from officers of the Nigerian services took part in various parts of the proceedings. Included among the delegates attending the Conference were officers of the Administrative Service of each Colony. This was a welcome and important innovation because successful agricultural extension work is dependent upon close co-operation between Agricultural and Administrative Officers. The proceedings of the Conference are now being printed and will be published as soon as possible.

151. There was no Agricultural Legislation enacted during the year and a financial statement is given as Appendix I.

J. R. MACKIE,
Director.

APPENDIX I.

STATEMENT OF EXPENDITURE UNDER HEAD 5, * AGRICULTURE: 1938-39.

	£	s.	d.	£	s.	d.
1. Personal Emoluments, Main Branch ...	64,667	16	8			
2. Transport Allowances	4,732	7	9			
3. Transport—General	1,123	18	9			
4. Transport—Railway	3,402	5	2			
5. Travelling Allowances	994	7	10			
6. Telephones	270	14	1			
7. Stationery	225	2	5			
8. Contingencies	37	17	7			
9. Uniforms	13	7	8			
10. Books and Periodicals	114	2	1			
11. Artisans, Overseers and Pupils	886	6	1			
12. Labour	7,915	10	1			
13. Poultry Farms	227	10	11			
14. Development of Cotton Industry	30	12	10			
15. Farming Equipment	1,566	14	8			
16. Rent and Compensation for Land acquired for Farms	14	3	1			
17. Upkeep of Laboratories	631	5	8			
18. Palm-Oil Extension Work	1,542	10	2			
19. Cocoa Extension Work	65	8	7			
20. School Equipment	95	17	7			
21. Development of Fruit Trade	22	8	10			
22. Water Supply	64	17	4			
23. Hostel Charges	46	17	8			
24. Sokoto Rice Mills	249	0	5			
25. Ilorin Stock Farm... ..	590	19	5			
26. Oil-Palm Research Station	587	19	8			
27. Agricultural Course in Trinidad for African Students	147	7	10			
28. Advisory Committee on Agriculture ...	16	17	4			
				£90,284	8	2

PRODUCE INSPECTION.

	33,989	4	3
29. Personal Emoluments	1,403	6	3
30. Passages	1,703	15	3
31. Transport Allowances	894	9	9
32. Transport—General	618	5	0
Transport—Railway			
Carried forward ...	£38,609	0	6

	£	s.	d.	£	s.	d.
Brought forward ...	38,609	0	6	90,284	8	2
33. Travelling Allowances ...	237	8	2			
34. Rent ...	26	1	0			
35. Seals and Presses ...	2,989	3	0			
36. Stationery ...	114	13	0			
37. Temporary Buildings ...	946	6	3			
38. Contingencies ...	25	1	6			
39. Bush Allowances ...	82	8	7			
40. Upkeep of Launch ...	809	13	2			
41. Telephones ...	192	7	0			
42. Produce Testing Apparatus ...	39	14	7			
43. Provident Fund; Bonus, etc. ...	1,331	9	10			
44. Uniforms ...	288	19	6			
				£45,692	6	1

SPECIAL EXPENDITURE.

1. Special Labelling Machine ...	65	15	5			
2. West African Agricultural Conference	611	7	7			
3. Sanitary Structures ...	131	16	10			
4. Temporary Buildings ...	585	0	0			
5. Cinematograph for Agricultural Propaganda ...	13	0	0			
6. Duplicators and Typewriters for Produce Inspection Branch ...	98	4	6			
				£1,505	4	4
Grand Total ...				£137,481	18	7

STATEMENT OF REVENUE UNDER AGRICULTURE, 1938-39.

	£	s.	d.	£	s.	d.
Head 2.— <i>Fees of Court or Office, etc.</i>						
Item 17. Produce Inspection ...	44,514	2	6			
„ 18. Overtime and Rebagging (Produce Inspection) ...	853	1	6			
				£45,367	4	0
Head 8.— <i>Earnings of Government Departments, etc.</i>						
Item 8. Agricultural Produce ...	919	2	0			
„ 17. Rice—Sokoto Mill ...	725	2	6			
				£1,644	4	6
				£47,011	8	6

